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# Plumbing Installation and Sewage Disposal.

## I. SOIL, WASTE, AND VENT PIPES AND TRAPS.

*By* CHARLES A. WHITTEMORE.

MANY problems in plumbing and sewage disposal are so comprehensive in scope that the service of an expert on these subjects is mandatory. Many of the problems are also of such a nature as to demand the attention of a trained biologist. With these the architect seldom comes in contact except to arrange the features of disposal plants along architectural lines. The object of this article is to present some of the principal facts in connection with the everyday plumbing problems which are met in every architect's office. Too many times plans for buildings are drawn, contracts let, and construction commenced without proper regard for such vital factors as the arrangement of pipes, proper spacing, and means of concealing the rough work. This statement may seem trite, but evidences of such facts may easily be seen in many of our best buildings.

The ideal plumbing installation is one in which the sanitary conditions are perfect, where all noise of water action is eliminated, where the piping is concealed, and where all the exposed parts of the system are so arranged as to have the minimum number of dirt catching places which may be breeding spots for germs. Seldom is it possible to obtain all the requisites of such an installation in one building; but by giving a little more thought to details which may seem unimportant it is possible more frequently to approach the standard of perfection about which much has been written.

Every architect has probably had the experience of advancing ideas in regard to the practical installation of plumbing work, only to be met by the plumber's statement, "It can't be done that way." Many times the plumber may be correct, but all too frequently his decision is based on the fact that to carry out the architect's ideas would involve a little more labor, even though it would give better results. A familiarity with the plumbing laws, and a little study into the practical requirements, would enable the architect to controvert statements not of fact and demonstrate the practicability of his requests.

In many cases it is wiser, no doubt, to leave matters of detail of installation to the judgment of the plumber contractor; but it is imperative that in matters of arrangement of pipes and fixtures the architect should have sufficient knowledge to be able to insist that work should be installed as best adapted to the general scheme of the project in hand. A little knowledge in some cases may be dangerous, but a little more knowledge may be the means of adapting the plumbing to the building rather than building around a plumbing installation.

The number of times that a partition has been changed, a door shifted, or a room rearranged because the architect had laid out his work contrary to the laws governing the installation of plumbing, is far too great to indicate that architects in general have given the requisite amount of consideration to this important part of a building operation. There are but few architects who are not familiar in a general way with the building requirements of strength and stability and general construction under which they work, and but few who are conversant with the plumbing requirements which are so vital a part of the same laws.

Too frequently plumbing questions are left to be worked out at the building. It is just as important that the course of a conductor pipe or soil or vent should be traced from the roof to the sewer, and the various traps and fixtures located when the plans are being drawn, as it is that the loads from the roof should be traced through the construction to the foundations. This may seem debatable, but in a harmonious, complete, and well built building the fact is obvious.

General knowledge of the various divisions of a plumbing system is so universal that a table of definitions would be superfluous in an article of this character. The process of manufacture is also a portion of specialized study which need not now be considered. It is, however, important to consider the practical side of placing pipes of various kinds, their functions, limitations, and general arrangements, and also to consider advantages or disadvantages of the different types of plumbing material and fixtures which now are in general use.

Soil pipes, which are those pipes carrying the discharge from closets or into which waste pipes are connected, if of iron, should be of the grade known as extra heavy. The "standard" or lighter weight pipe is never used in the best work. The "extra heavy" is usually cast with a raised "XH" on each length and should weigh not less than 2¾ pounds per inch of diameter for 2-inch pipe; not less than 3¼ pounds per inch of diameter up to 7 inches, and for larger sizes up to 12 inches, not less than 4¼ to 4½ pounds per inch of diameter. Tables giving the exact weight for various sizes may be found in any good handbook. These pipes come in two forms,— coated or uncoated. Coated pipe is treated with hot asphalt or pitch both inside and out and offers more resistance to corrosive action than the plain pipe. Some plumbing regulations, however, will not allow coated pipe to be used, but insist on plain pipe. The object of using uncoated pipe is that tests may be made to determine whether or not flaws in the nature of sand holes exist, which may be more readily

tested in the uncoated than in the coated pipe, and also that imperfections may not be covered over and later develop a serious defect. The uncoated pipe should, however, never be used without being painted both inside and out with red lead or some equally good protective paint, after being thoroughly tested with oil.

In connection with the use of cast iron pipe, all the fittings should be of the same grade; that is, with the extra heavy cast iron pipe extra heavy fittings should be used, and where uncoated pipe is specified or required by law — as in New York and some other cities — the fittings should be uncoated also. These fittings, as well as the pipe itself, should be examined to ascertain if the pipes are cylindrical and smooth inside and also be examined for cracks, sand holes, presence of slag, and other detrimental features. It is advisable in using cast iron pipe to specify the maker's name and see that each length of pipe and all fittings used are stamped with the same marks of the manufacturers.

Next in importance to perfect pipe in making a plumbing system gas tight is the method of connecting the various sections. Joints between lead pipe and iron pipe should be made with heavy brass ferrules; between lead and lead, or lead and brass, the joints should be wiped joints; joints between outlets of trap waste or vent pipes should be all screw joints. Cup joints, slip joints, or union joints should never be allowed, nor should leather packing or putty be allowed in connection with any air, vent, soil, or waste pipes.

In making up joints in cast iron pipes the spaces between the hub and spigot end should first be filled with a ring of picked oakum which should be well pounded in place. Molten lead should then be poured in and well hammered with calking tools to expand the lead and ensure tight contact with the iron. In the best practice a second layer of picked oakum and a second layer of lead is insisted upon in order to make positive that the joint is thoroughly gas and water tight. In making connections with cast iron pipe where two pipes come together at an angle, the connections should be made with the proper T-Y or Y branches, and no branches at an angle less than 45 degrees with the main line should ever be allowed. All changes in direction of a soil line should be made with curved pipe, Y branches in which one leg of the Y affords an opportunity for a cleanout, or ¼, ⅛, or ⅙ bends.

Tile drain pipe should never be used in a building as a part of the main soil system, but is frequently used from a point 10 feet beyond the wall to the sewer. In residential work it should never be used in a position where the contents of the pipe might contaminate a water supply, or where it is likely to be subjected to the action of frost. The joints of this kind of pipe are so difficult to make permanently tight that its use is restricted to unimportant parts of an installation. In forming drains around walls to carry off surface water it is valuable, and also to form part of a general ground drainage system. In such cases the pipe is either vitrified or glazed and laid with open joints, or a porous tile is used.

The tile pipe used for sewer connections is made in two grades,— salt glazed and "slip glazed" or coated. Salt glazed pipe is composed of a clay which vitrifies on both outside and inside when it is fired, and is preferable in all sewer or soil work because the glazing is not subject to the imperfections so frequently found in coated tile pipe. When the salt glazed pipe is used, however, the inside of the hub and the outside of the spigot end, if left unglazed, form a good surface to bond the cement used in making the joint. When the pipe is glazed on both hub and spigot, the joint should be filled with a layer of picked oakum well calked in place and the remainder of the space filled with a good cement or hot asphalt. The asphalt is more elastic and in places where there is possibility of the pipe moving, as in case of settlement of the earth around it, should be used in preference to the cement.

The slip glazed or coated tile pipe is formed of a soft clay with a coating of vitrifying clay applied to the surfaces before firing. The principal objection to this kind of pipe is due to the fact that the coating does not become an integral part of the pipe and in use is likely to become damaged, leaving the unvitrified, porous pipe exposed.

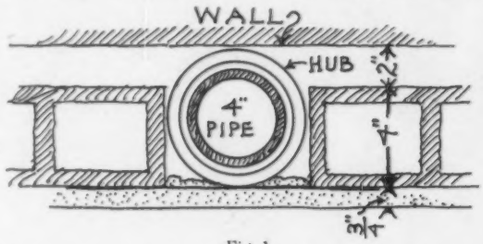



Fig. 1
Plan Showing Minimum Furring to Conceal 4-Inch Soil Pipe

An important problem in the installation of soil pipe, wastes, vents, etc., is to so arrange these pipes as to be economically spaced and still be concealed from view. Many architects, in laying out their work, overlook the fact that 4-inch pipe is 5¾ to 6 inches over the hubs, and that while 4 inches of furring with an inch of plaster against a brick wall would thoroughly cover the larger portion of pipe, the hubs and fittings will all project through the finished plaster surface unless precautions are taken to ensure their concealment. Fig. 1 shows the closest possible arrangement where pipes come in contact with a furred brick wall, under which conditions a 4-inch soil pipe may be concealed. Provision should always be made so that joints may be calked when the pipes are in position, as frequently it is impracticable to make up long lengths of pipe and thus eliminate the calking of joints after the pipes have been erected.

Aside from the difficulty of concealing vertical lines of the pipe, the horizontal run-outs require the most attention. In arranging to avoid skeleton construction or beams, or to come within the thickness of the floor construction, particular care must be taken.

Where concrete construction is used, the main difficulty in installing the horizontal branches comes in connection with the calking of the joints. The pipes cannot be made up and cast into the floor slab on account of the necessity of removing the wood forms and the extra difficulty attendant upon this process if pipes or other construction materials are in the way. In order to gain the greatest amount of space, the bends, or fittings which extend from a main soil branch to take the various fixtures, should be arranged so that the joint in the hub of the fitting which comes in contact with the length of pipe passing through the floor should never be closer than 4 inches to the under side of the concrete slab, and even in this case a special bent calking tool will be required, or the joint should be calked

from above. It should always be borne in mind that wherever a soil pipe passes through a floor and a branch main is taken off for fixtures on this floor, the extension of the branch main, if there are more than one or two fixtures on it, requires a vent of the same size as the pipe itself. This pipe must extend full size from the lowest branch up through the building to a point above the highest fixture, and there either be connected with the extension of the original soil pipe or be carried independently through the roof as a vent.

The waste pipes are known in practice as the pipes carrying the waste water from fixtures such as lavatories and sinks. These pipes are usually of galvanized wrought iron or iron size brass, although in many instances a small size cast iron pipe is used. Lead pipe should never be allowed for waste, vent, or soil pipes.

Wherever the cast iron waste or vent pipe is used, the same considerations as noted above apply in making up the joints. Wherever galvanized or wrought iron pipe is used, the joints are made up with threaded couplings, in which case the thread should be cut so that the ends of the pipe, when finally assembled and placed in position, will be in contact inside of the fittings, or else special recessed fittings should be used. These joints should be made up with red lead or white lead in order to ensure their being gas and water tight, and care should be exercised to see that all burrs are reamed out.

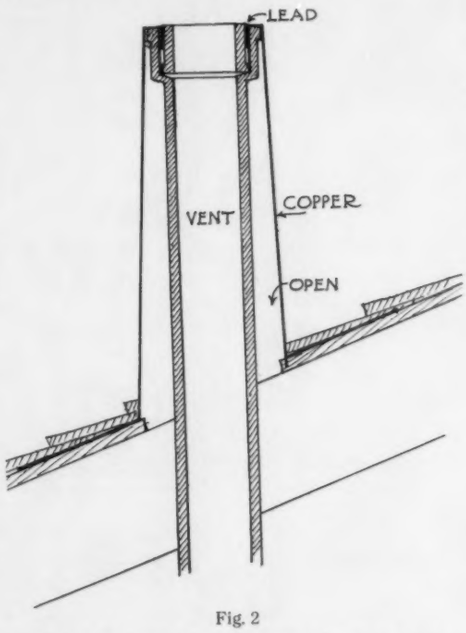



Fig. 2
Section Showing Copper Collar to Prevent Leakage Around Soil Pipe

There are special fixtures which may be used on a waste pipe in order to take branches coming from opposite sides, as, for instance, in office buildings where bowls are located on opposite sides of a partition. For such places a double T-Y or a special vent fitting is used, and the wastes and vents are taken from the same connection. Where waste lines extend through several floors with bowls on opposite sides of the same partition, as in an office building with various floors divided in the same manner, the fixture wastes occasionally are connected to the soil stack on one floor, to the vent stack on another floor, and so on. This construction is somewhat simpler and more readily ensures the cleansing of rust or scales or anything that might lodge in the vent stack. The conditions from a sanitary standpoint are as good as though separate soil and vent lines were run and connected in the usual manner.

In installing waste pipes, soil pipes, and also vent pipes in very high buildings, the vertical pipes should not be rigidly connected to the construction. A slip support should be used to permit a slight movement in the connection, in a vertical direction, if any settlement should occur in the building or if any undue expansion should take place in the pipes themselves.

The vent pipes are pipes installed to relieve the air pressure from the main soil stacks and to prevent siphoning of traps and also to allow the free passage to the open air of any gases that may originate in or enter the system. The sizes of the vent pipes follow regular defined laws, and where soil branches are used should be the same size as the soil branch pipes. In other words, a continuation of the soil line forms the vent. The vents from smaller fixtures such as sinks, lavatories, etc., are smaller in size and are most frequently galvanized or wrought iron, with the fittings of the same material. The vent pipes should enter the main vent stack at a point not less than 3 feet above the seal of the trap, and the vent should be taken from the high point of the trap. According to the best practice, vent connections for closet and slop sinks should be made from the branch soil or waste pipes just below the trap of the fixture and in such a manner as to prevent obstruction. No other waste pipe should be connected between this vent and the fixture.

The end of vent pipes should never be connected to a chimney, as the evaporation of the seal of traps is much more readly accelerated and thus allows gases more easily to enter the building. The vent pipes should always extend through the roof and should be made 1 inch larger in size than the main vent stack, but never less than 4 inches in diameter. The fittings for all vent lines should be of the same material as the vent pipe lines, and no offsets should be made on an angle less than 45 degrees to the horizontal. Every vent line should be connected at the bottom with a soil or waste pipe, or a drain in such a manner as to preclude the possibility of an accumulation of dirt or rust scale. Accumulations of this character are never to be encountered in pipes through which water is continuously flowing. Vent pipes are subject to corrosions due to the moisture and gases which they themselves carry off, and this increases the likelihood of rust scales forming which would fill the pipe unless proper precautions are taken to prevent it.

No vent pipes less than 1½ inches should be allowed; and up to 3 inches in diameter should be galvanized wrought iron pipe, plain wrought iron pipe being subject to deterioration through rust. All vent pipes 3 inches and larger in size should be extra heavy cast iron.

Where the vent pipes pass through the roof, the joint and flashing must be made with special care to prevent leakage. There are various methods of constructing this connection. The more common and less expensive method is that in which a copper or lead sheet is secured to the roof below the finished surface. To this is soldered a collar which extends about 6 inches above the roof. A counterflashing of the same material is secured to the vent pipe by a soldered joint or by a joint formed with a tight

gasket of lead and secured by means of an iron clamp. This counterflashing prevents leakage and moves with the expansion and contraction of the pipe.

Another method shown in Fig. 2, which is more perfect but more expensive, is to extend the pipe above the roof 2 or 3 feet with a copper collar carried the full height of the pipe and leaded into the hub at the top. A still better construction is to use a "double hub" shown in Fig. 3. The hub is slipped over the pipe and secured about 6 inches above the roof, the lower hub being set over the copper collar referred to in the first method. The upper hub is then calked in place in the same manner as in making up a joint in cast iron pipe. This ensures a thorough, lasting joint in which the possibility of leakage is very remote.

The traps used in connection with plumbing fixtures are from the standpoint of sanitation a most important part of the installation. If the remainder of a plumbing system is perfect, the value of the good work may be completely nullified by the use or improper installation of the fixture traps. The standards by which the merit of a trap may be judged are: first, the resistance offered to the breaking of the seal and thus allowing the sewer gas to pass into the building; second, the volume of water forming the seal; third, the ability of the trap to cleanse itself at each flush of water passing through.

There are two general types of traps, — the siphoning and non-siphoning. These terms do not apply to the method of installation alone, although a siphon trap may be installed in such a manner as to be non-siphoning to a certain degree. The difference between them lies principally in the manner in which they are constructed. Ordinary or siphon traps have a perfectly smooth bore their entire length, while the non-siphoning traps are usually arranged with a large water capacity or of a special shape so as to prevent the air pressure from becoming great enough to force or draw the water out of the trap.

The simplest form of trap is the U-trap. In this the seal is that part of the U which lies below the bottom of the straight pipe and is at all times full of water, thus preventing the gases in the drain from entering the building through the fixtures. It is not a satisfactory type for general use, because the seal is easily broken and because the volume of water will not be sufficient protection against loss of seal from evaporation.

The seal of a trap may be broken in three ways: by evaporation, by siphoning from the mass of water passing through the main soil stack, and by self-siphoning from the mass of water passing through the trap itself.

Evaporation may be overcome by providing a sufficient body of water in the trap to protect the trap if not in use for a considerable period. The rate of evaporation may easily be estimated so that the length of time the seal will remain intact if no water is passed through it may be accurately determined. It is far better in cases where traps are likely to be in disuse for some time to have the water taken out and a non-volatile fluid put in. For example, where summer residences are left without attendance during the winter, the trap should be cleaned out and petroleum, kerosene, or a similar non-volatile and non-freezing oil should be put in to keep the seal intact. In planning work this point is frequently overlooked and consequently no adequate provisions are made so that easy access may be had to the traps. In one such case the plumber was forced to tear up a considerable portion of a finished floor in order to get at the traps to fill them with oil. Such occurrences would not take place if a little more thought were given to the practical requirements.

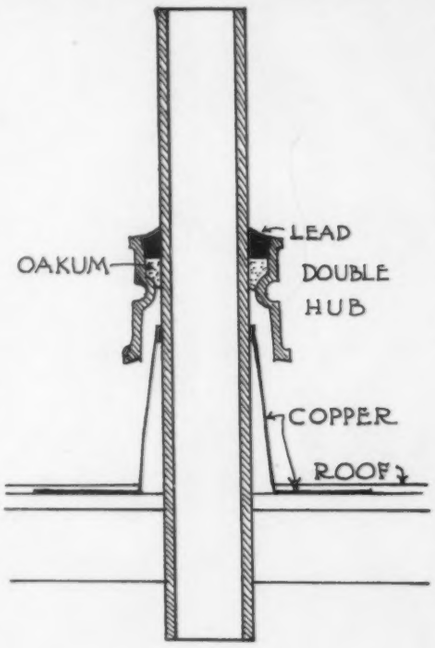



Fig. 3

Section Showing Arrangement of Double Hub to Prevent Leakage Around Soil Pipe

If traps are installed so that the outlet from the trap connects with a waste pipe at an angle less than 45 degrees, the possibility of self-siphoning is great, particularly if there is a long run to the soil pipe. The flow of water through the trap forms a suction which is greater than the resistance offered, and the seal is broken. To obviate this, vents are installed and connected to the crown of the trap or to the waste pipe just below the trap outlet. The vent at the crown is objectionable because it facilitates the evaporation of the seal, but this objection is not great when the trap is in frequent use.

If ordinary traps are installed without vents and only a short distance from a soil stack, there is a possibility that the volume of water in the stack may exert sufficient force on the branch pipe to pull the water from the trap. This possibility is very remote when vents are installed.

# Some Old and Unfamiliar Spanish Buildings.

## VI. PALACIO ARZOBISPAL, NOW ARCHIVO HISTORICO, ALCALÁ DE HENARES.

*By* ARTHUR G. BYNE.

*Illustrated from Photographs Specially Taken by the Author.*

THIS palace was the Alcalá residence of the archbishops of Toledo, who were primates of all Spain. The two who, in the middle sixteenth century, commissioned the architect Covarrubias to build it were Fonseca and Tavera. The former was the son of that bishop Fonseca who had left several fine buildings in Salamanca. The architect was son-in-law to the great transitionalist in Spanish architecture, Enrique de Egas. Covarrubias gave Spain its finest Renaissance buildings.

His plan for the Archiepiscopal palace at Alcalá called for four great patios, but only the one illustrated was ever completed. Each patio was to have a monumental staircase, but only one — the one shown — was finished. Even incomplete, this edifice, with its splendid carving and rich Mudéjar ceilings, comes nearer to the best architecture of Italy than any other building in Spain. It is, nevertheless, unmistakably Spanish because of that subtle freedom, almost carelessness, which imparts a distinctly *un*Italian charm to the best Renaissance ornament in Spain. In the carving this carelessness is paradoxical, for it shows an unerring precision of touch, such as a skilful impressionist working in clay gives at the last moment.

It is interesting that Covarrubias, with his obvious familiarity with Italian Renaissance, should have been content to forego the façade and concentrate all his ingenuity on beautiful interior courts and galleries. Nothing on the exterior of this Alcalá palace suggests even remotely the magnificence of the interior; and this because the architect could not, or did not care to, break away from the Mussulman tradition that still prevailed in domestic architecture — a simple exterior with gradual increase of luxury, surprise, even mystery, on entering. This adherence by Spanish builders to the Moorish idea is one reason why much of their Renaissance is adaptable for terra cotta — it is an enclosed architecture where richness of modeling in ornament can be appropriately practised.

The doorway reproduced here is under the patio arcade between the main entrance and the grand stairway. It leads to a small antechamber and is surmounted by the arms of Cardinal Tavera. Few architects are aware that such pure Renaissance as this doorway with its artistic reserve could be found outside of Italy; least of all in Spain, where Renaissance is so seldom sober and restrained. As for the patience that went into the ornamental rustication, it is doubtful whether an equal exhibition of perseverance could be found even in Italy. If all the workmen who executed it were not painstaking Moriscos, there were enough of these at any rate to set the example.

These blocks are carved with consummate skill and show an infinite variety of design, with mythological winged figures predominating. If any two blocks are alike in detail, they are placed too far apart to be easily detected.

Rustication was never as popular in Spain as in Italy, and when used it was not in the structural way of the Italians, but merely to ornament a stone surface. This is undoubtedly why the whole motif makes one think of terra cotta. Not a very large area has been carried out, however, for hard times came upon Spain before Covarrubias' entire scheme for a sumptuous palace could be realized.

The staircase, of which the upper part is illustrated, shows besides unmistakably plateresque ornament, certain eccentricities of construction that could never be found in the native land of Renaissance, since they arise from an amusing misunderstanding of her motifs. The balusters, for instance, instead of being individually turned and carved, are carved in groups of three from a single block with a central piece left to connect them; in other words, it is a Gothic method of arriving at a Renaissance form by means of perforation. Covarrubias grasped the decorative value of the spindle, but never dreamed of treating each one as a unit; he constructed his stair balustrade exactly as his Gothic father-in-law had done at Toledo. Oddly enough, this construction that seems so strange in stone would be the most logical method were the material terra cotta.

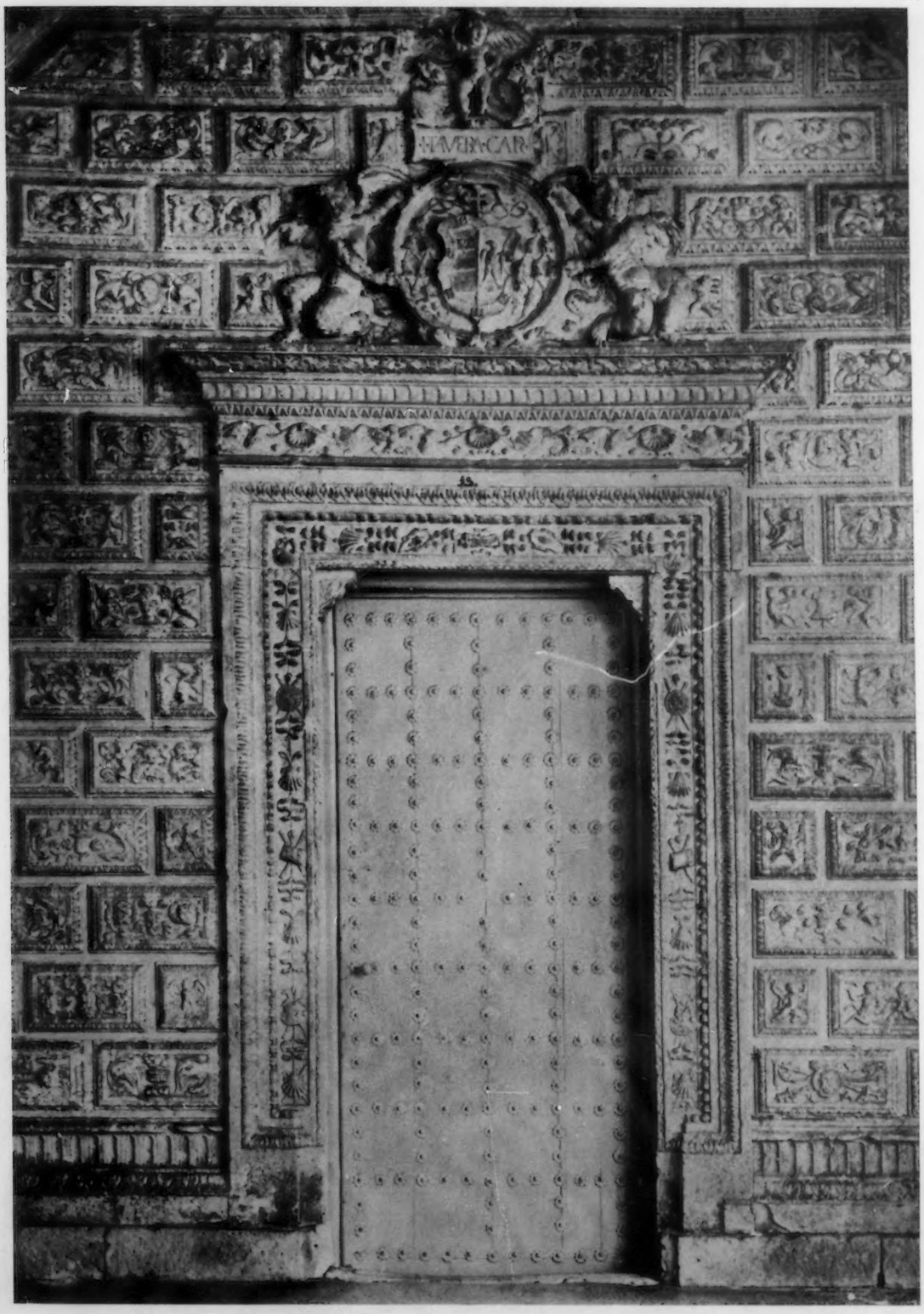
One regrets the Moorish influence that allowed the architect to break his arch in three; fortunately, the pure arch only is used in the lower arcade of the patio. This arcade is beautifully built, not with a masonry vault, but with a light wooden ceiling of the Moorish, or rather Mudéjar, type, Mudéjar being the term applied by the Spanish to the work done for them by those Moorish artisans who remained in the country after the fall of Granada.

The upper colonnade and cornice are a very typical bit of Spanish Renaissance. The double corbel over the column traces its pedigree straight back to the extra wooden beam with carved ends which was used as a support by all Moorish builders. The whole treatment of the upper gallery, in fact, is a stone interpretation of a wooden loggia, as seen in the best preserved Moorish palaces. The walls here are merely of plaster, but with a dozen or so of fine doorways inserted. These are cut in stone and are as effective as the one given. All vary in detail.

An architect who could put up with the meager accommodations of the Alcalá inn could busy himself for a week in this old *Archivo* — not over the many precious documents it contains, but in studying the vast wealth of suggestions in the small completed portion of the Bishops' palace.

UPPER PART OF STAIRCASE

PALACIO ARZOBISPAL, ALCALÁ DE HENARES, SPAIN



DOORWAY IN PATIO
PALACIO ARZOBISPAL, ALCALÁ DE HENARES, SPAIN

DETAIL OF LOGGIA
PALACIO ARZOBISPAL, ALCALÁ DE HENARES, SPAIN

# Design and Construction of Roof and Wall Trusses.

## II. LOADS AND THEIR APPLICATION, STRESSES, AND DIMENSIONS OF MEMBERS AND DESIGN OF CONNECTIONS.

By MALVERD A. HOWE, C.E.

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ALL trusses should be so designed that the loads imposed upon them shall be concentrated at their apexes, that is, at the points where the members of the truss meet. This arrangement produces only direct tension or compression in the truss members. If loads are applied between the apexes directly to the truss members, such members must be designed for cross-bending stresses as well as for direct stresses. For light roofs, however, it is customary to support purlins between the apexes of the top chords of trusses. Usually this practice should not be followed.

The actual weights of roof covering, roof framing, etc., as well as of ceilings and floors, are readily determined, and the proper amounts to be placed at the truss apexes decided upon. The weight of material in a single truss is found either from tables of weights or by means of an empirical formula. For spans between 40 and 125 feet, wooden trusses weigh from 3 to 10 pounds per square foot of roof surface, and steel trusses weigh from 5 to 14 pounds per square foot of roof surface supported. The smaller weights are for trusses supporting roofs of half pitch, and the larger weights for trusses supporting flat roofs.

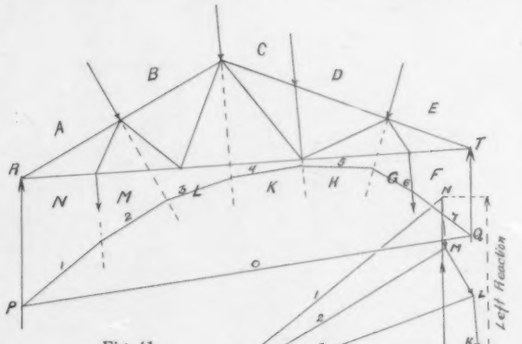


Fig. 41

The weight of snow which is likely to remain on the roof depends upon the pitch of the roof and local climatic conditions. Roofs of half pitch will not retain snow unless snow guards are used. It is seldom that a snow load exceeding 30 pounds per horizontal square foot of roof is assumed, even in New England and the Northern States. In Chicago 20 pounds is assumed as snow load and in St. Louis, 10 pounds.

The actual effect of wind upon a roof truss is almost an unknown quantity. The general practice is to assume a wind pressure of 30 or 40 pounds against a vertical surface and then reduce this force to a force normal to the roof by an empirical formula. Using 30 pounds as the normal pressure against a vertical plane surface, the normal pressure on a roof of one-sixth pitch is 13 pounds; one-fourth pitch, 18 pounds; one-third pitch, 22 pounds, and on a roof of one-half pitch, 27 pounds. These values are per square foot.

Mr. C. C. Schneider, in his "General Specifications for Structural Work of Buildings," states: "In climates corresponding to that of New York, ordinary roofs, up to 80 feet span, shall be proportioned to carry the minimum loads in Table VI per square foot of exposed surface, applied vertically, to provide for dead, wind, and snow loads combined.

TABLE VI.

MINIMUM LOADS ON ROOFS.

| | |
|---|---|
| Gravel or Composition Roofing | |
| On boards, flat slope, 1 : 6 or less | 50 pounds |
| On boards, steep slope, more than 1 : 6 | 45 " |
| On 3-inch flat tile or cinder concrete | 60 " |
| Corrugated sheathing on boards or purlins | 40 " |
| Slate on boards or purlins | 50 " |
| Slate on 3-inch flat tile or cinder concrete | 65 " |
| Tile on steel purlins | 55 " |
| Glass | 45 " |

"For roofs in climates where no snow is likely to occur, reduce the foregoing loads by 10 pounds per square foot, but no roof or any part thereof shall be designed for less than 40 pounds per square foot."

The stresses found by using the loading specified above are usually larger than those obtained by combining the stresses produced by the various loadings considered separately.

### STRESSES IN TRUSS MEMBERS.

The determination of the stresses in the truss members is not difficult, even when the trusses are not symmetrically shaped about the center of the span, and when the loads are not parallel and equal. Many text books and pocket books explain graphical and algebraic methods for the determination of stresses. Nevertheless, the following routine method, on account of its general application, may not be out of place here.

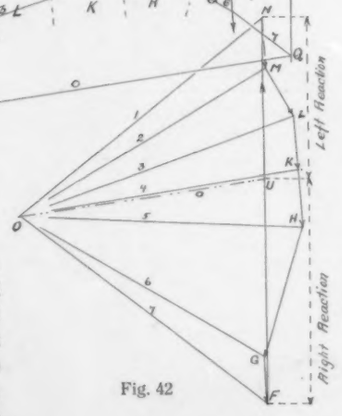


Fig. 42

In Fig. 41 is shown an unsymmetrical truss with unsymmetrical loading. The first step towards finding the stresses produced by the loads is the determination of the reactions at the supports. Between the supports draw a horizontal line RT (in this case the line follows the bottom chord of the truss) and prolong the directions of the load forces as shown by the dotted lines, and then place the letters N, M, L, etc., in the spaces between these lines as shown. In Fig. 42 lay off to scale the forces in their proper magnitudes and directions as shown by the broken line NML - - - - - F and draw FN. This line gives the direction of the reactions at R and T, as shown by the lines PR and QT, Fig. 41. In Fig. 42, from any convenient point O draw the lines numbered 1, 2, 3, 4, etc., and then in Fig. 41, beginning at P, any point on PR,

draw the lines 1, 2, 3, 4, etc., parallel to the corresponding lines in Fig. 42. Join P and Q in Fig. 41, and draw OU in Fig. 42 parallel to this line; then FU represents the reaction or supporting force at T, and UN that at R.

The forces acting upon the truss may now be represented as shown in Fig. 43. Beginning with the force AB, lay the forces off in order as shown in Fig. 44, and then construct the stress diagram in the usual manner by drawing lines parallel to the truss members so that the lines meeting at a point in Fig. 43 shall, with the external forces at that point, form a closed polygon in Fig. 44. The lines in Fig. 44 represent the stresses or forces acting at the apexes of the truss. For example, AK in Fig. 44 represents the stress in the truss member between the letters A and K in Fig. 43. The character of the stress is found as follows: separating the stress polygon NAK from Fig. 44, as shown in Fig. 44a, the direction of NA is known, and, in order that the figure may be a closed polygon, AK and KN act as shown by the arrowheads. Transferring the directions to Fig. 43, the kind of stress is at once evident, AK is in compression and KN in tension. Figs. 44b and 44c are similar stress polygons separated from Fig. 44.

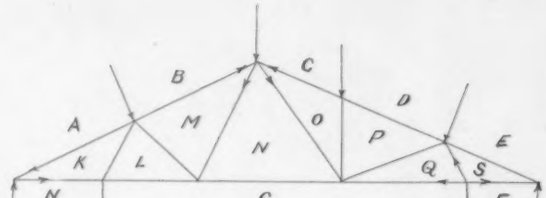

Fig. 43

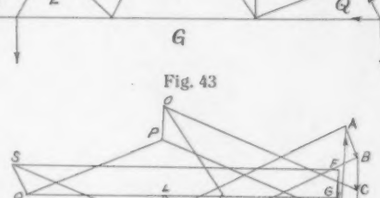

Fig. 44

Fig. 44a

Fig. 44b

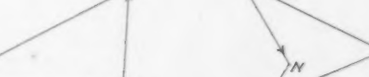

Fig. 44c

In case there is a set of rollers at one support, the reaction or supporting force is vertical in direction, and its magnitude equals the vertical component of the corresponding reaction as found in Fig. 44.

### Dimensions of Truss Members and Design of Connections for Wooden Trusses.

*Compression Members.* The safe stress which a compression member can transmit depends upon the shape of its cross-section, its unsupported length, and its area. Timbers of the same area and length have quite different carrying capacities. For example, a piece 1 by 4 inches, 6 feet long, will not support as great a load as a piece 2 by 2 inches which has the same length. The piece having the *least dimension* is the weaker. Again, if the sticks are of the same section, the longer piece will not support as great a load as the shorter piece. A 1 by 4 inch piece, 12 feet long, is not nearly as strong as a piece 1 by 4 inches, which is 6 feet long.

It is customary to proportion compression members by the application of an empirical formula which gives in a particular case the load *per square inch* for given values of *unsupported lengths* and *least dimensions*. The unsupported length is usually the distance between the apexes at the ends of the piece, but this is not the case where there is no framing to prevent deflection sidewise. Trusses should be braced in pairs at each apex of the compression chords; the neglect of so doing has been the cause of a number of accidents. The *least dimension* is the smaller of the two dimensions of the cross-section of the piece, and the *actual size* of the stick should be used. There are numerous tables published which give the total loads for timbers of market sizes and of various lengths. Such tables should not be used unless they are based upon the *actual sizes* of the timbers and not upon the nominal sizes as is generally the case.

In case the compression member is made up of several pieces as, say, six planks 2 by 12 inches to form a member 12 by 12 inches, the pieces must be securely fastened together by bolts spaced not more than *fifteen* times the smallest dimension of a piece. That is, a 2-inch piece must have bolts spaced not over 30 inches apart.

Good practice limits the maximum *unsupported length* of compression members to 30 times the least dimension. Portland, Ore., specifies 20 in place of 30.

There is no universal formula for wood in compression, which is somewhat remarkable when one remembers that wood has been used in structures from earliest times. Looking over the building laws of about thirty-one cities, sixteen different formulæ are found. The American Railway Engineers Association has adopted the following formula as a standard: The strength per square inch of a column, strut, or any piece in compression equals $B(1 - L/60D)$, where B is the compressive strength per square inch on the end fibers of a piece not over 15D long, L the unsupported length of the piece, and D the least dimension of the strut. B is expressed in pounds per square inch and L and D are expressed in the same unit, usually inches. The safe values of B are given in the building laws of several cities, and when used in the above formula the results are conservative.

*Tension Members of Wood.* The tension members of wood cannot be proportioned independently of their connections, as the connections at the joints or apexes require considerable cutting in the way of notches and holes. This will be considered in conjunction with the design of splices and other connections.

*Tension Members of Wrought Iron or Steel Rods* are commonly employed for certain web members of wooden trusses. They are usually made of round rods having threads for nuts at both ends. There must be sufficient area at the root of the threads to safely carry the tensile stress imposed. The customary unit stresses are 12,000 pounds per square inch for wrought iron and 16,000 pounds

for steel. A considerable saving in weight is made by upsetting, or enlarging, the ends of the rods, so that the area at the root of the threads is a little in excess of that of the body of the rod. If upsets are used on steel rods, they must be very carefully made, or the rod will be considerably weaker than the net area indicates. This is due to the fact that steel is injured in the process of upsetting. If the *entire rod after being upset* is properly annealed, there can be no objections raised against its use. Upsets on wrought iron rods are much more reliable than those on steel rods.

*Splices for Wood in Tension* are of many forms, of which only a limited number can be critically considered.

One of the older forms of splice is shown in Fig. 45, and is made, practically, entirely of wood, as the bolts shown have little to do other than to keep the pieces in place. This splice may fail in direct tension at the smallest section of the main member, or the splice plates, or in compression on the end fibers at the notches bf, or by longitudinal shear along the planes ab or fg. To design this splice, let

T = the permissible tension with the grain of the wood,

C = the permissible direct compression with the grain of the wood,

$C_x$ = the permissible compression across the grain of the wood,

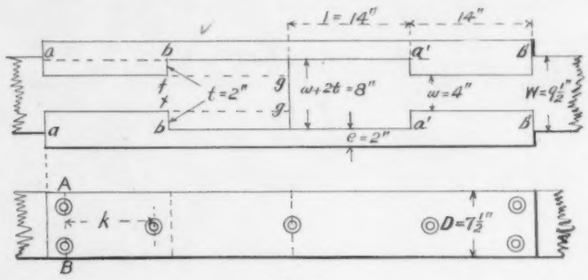


Fig. 45

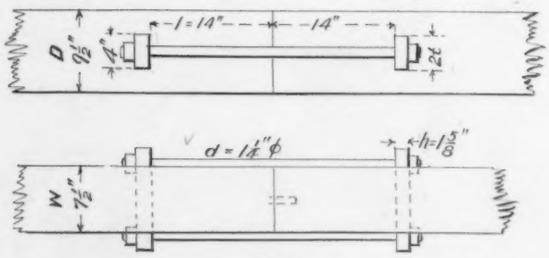


Fig. 46

S = the permissible shear with the grain of the wood, and d = the diameter of the bolt holes.

All stresses are expressed in pounds per square inch and all dimensions in inches.

If the depth D of the member is assumed, then the proper values of w, t, and l are found from the relations:

$$(D - 2d)Tw = \text{total tensile stress, (1)}$$
$$2(tD)C = \text{total tensile stress, (2)}$$
$$\text{and } 2(lD)S = \text{total tensile stress. (3)}$$

In the building laws of Chicago, 1913, for short-leaf yellow pine, T = 1,000, C = 800, and S = 120. Assume the total stress as 24,000 pounds and D as 7½ inches, then if ¾-inch bolts are used with a driving fit,

$(7.5 - 1.5)\ 1{,}000w = 24{,}000$, or $w = 4$ inches;
$2(t\ 7.5)\ 800 = 24{,}000$, or $t = 2$ inches,
and $w + 2t = 4 + 4 = 8$ inches.

This fixes the minimum size of the main member as 8 by 10 inches nominal size, or 7½ by 9½ inches actual size. In this particular case the same size piece is required if D is assumed 9½ inches.

The distance fg is found from equation (3). $2(17.5)120 = 24{,}000$, or $l = 13.3$, say 14 inches. This expression ignores the surface lost through the bolt holes and also the additional strength due to the bolts. If the splice bars are of the same kind of wood as the main member, ab = fg and e is a half of w, approximately.

This design assumes that there are no other connections. If, as is often the case, the splice is located at a joint, then allowance must be made for any cutting which reduces any of the areas found above.

Fig. 46 shows a very efficient splice. The two rods and cross bars are made of rolled steel. If the permissible tension for steel is 16,000 pounds per square inch, each of the rods is 1¼ inches in diameter if the total stress is 24,000 pounds. The total area of wood in end bearing for one cross bar is found from the equality $7.5(2t)800 = 24{,}000$, or $2t = 4$ inches. The thickness of a cross bar is determined by its cross-bending strength and can be found from the expression, (2d + W) (total stress) /8 = 16,000 (2t) $(h^2)/6$, where the permissible fiber stress for steel is 16,000 pounds per square inch. For the splice shown in Fig. 46, (2.5 + 7.5) (24,000)/8 = 16,000 (4) $(h^2)/6$, or h = 1⅝ inches.

The distance of each bar from the end of the piece it is in is 14 inches, corresponding to the distance l in Fig. 45.

The splice shown in Fig. 47 is suitable for exposed trusses. The steel plates are each ¼ inch thick and the bearing bars 1 by 3 by 7½ inches, the total stress being 24,000 pounds. These are attached to the side plates by two ¾-inch rivets in each bar. The ¾-inch bolts or lag screws hold the pieces in place and counteract the tendency of the bearing bars to rotate. This type of splice was used for the main trusses, 90-foot span, of the Forestry Building, Pan-American Exposition.

This splice (Fig. 47), requires facilities for countersinking holes and driving rivets. If bolts are used in place of the rivets, their size can be found as follows: Bolts ¾ inch in diameter will be safe in shearing and bearing on a ¼-inch plate, but to resist a bending movement 3,000 (½ + ⅛) = 1,875-inch pounds, for each end of each bolt 1-inch bolts are required. The use of bolts is not as satisfactory as the use of rivets. The rivets fill the holes in the plates and bars and are not considered as being subjected to bending stresses, while the bolts may or may not fit tightly in the holes and, consequently, must be considered as being subject to bending stresses.

When bolts are used as just explained, care must be exercised to have all threads well outside the plates. This necessitates the use of washers under the nuts.

If no bearing bars are used and the strength of the splice is made to depend upon the bolts and side plates, more bolts will be required, or the bolts must be larger. If only four bolts are used, the total stress and size of timber being the same as for Fig. 45, each bolt carries one-

fourth of the entire stress, or 6,000 pounds. The bearing of a round bar against the ends of wood fibers may be taken as one-half that for a flat bar, or in this case 400 pounds per square inch. The diameter of each bolt is 6,000/(7.5) (400), or 2 inches for bearing. The total bending moment which must be taken by the four bolts is

$$24{,}000\ (2t + W)/8 = 24{,}000\ (0.5 + 7.5)/8$$

= 24,000-inch pounds, or 6,000-inch pounds for each bolt. This is considerably less than the capacity of a 2-inch bolt in bending.

The use of four 2-inch bolts makes a clumsy joint (Fig. 49) as the bolts must be spaced about five diameters apart and require large nuts, even when recess nuts or thin nuts with washes are used.

Nine 1⅛-inch bolts have a bending capacity of 25,200-inch pounds, and a bearing capacity against wood of 30,400 pounds, and against the ¼-inch plates a bearing value of 25,300 pounds. These bolts may be spaced 5½ inches apart as shown in Fig. 48. Washers must be used under all nuts in this type of splice in order that the threads on the bolts may be outside of the side plates.

A form of splice sometimes used for connecting tension and also compression members is shown in Fig. 49. Round pins made of very hard wood or metal are used as shown. The bearing against the end fibers of the wood is the same as for Fig. 48, if metal pins are used. If wooden pins are used, the bearing value across the grain of the wood of the pins governs. In order that the pins may be effective, the side bars are securely bolted through the main member and enough bolts used to resist in tension at least one-half the total stress in the main member. The square bars shown in Fig. 49 are much more efficient but require careful work in fitting them in place.

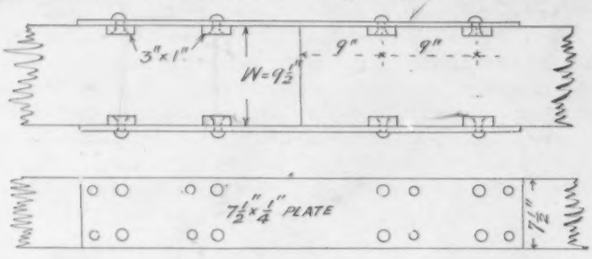


Fig. 47

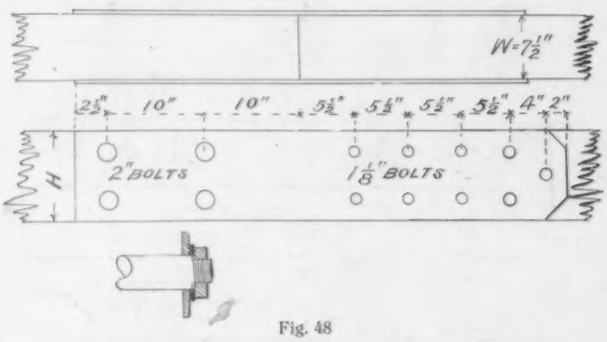


Fig. 48

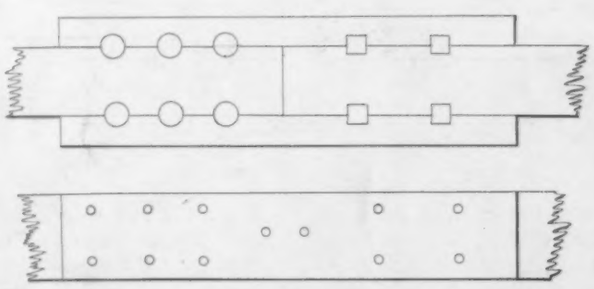

Fig. 49

This splice is efficient as long as the bolts remain tight, but the round pins are especially inefficient if the bolts become loose due to the shrinkage of the wood.

Since the round bars have a tendency to roll and the square bars a tendency to rotate, small unit stresses should be used in designing this type of splice.

All of the splices described above are suitable for solid timbers. In case the tension members are made up of planks, the splicing is accomplished by arranging the planks so that the breaks in continuity of the strands do not occur at sections which are near together. Usually the equivalent of one strand of plank is required to splice the remaining strands. The use of spikes to fasten the strands together is preferable to bolts, as the tightness of the spikes does not appear to be affected by the shrinkage of the wood.

*Splices for Wood in Compression.* Members in compression composed of solid timbers are spliced by butting the squared ends and holding them in place by planks spiked or bolted to the sides of the timbers. Generally compression members are obtained full length, so that no splicing is necessary. If a splice is required, it should be located as near as possible to a truss apex or joint. Built-up compression members require no special treatment other than having the squared ends of the planks in each strand closely in contact and all thoroughly spiked.

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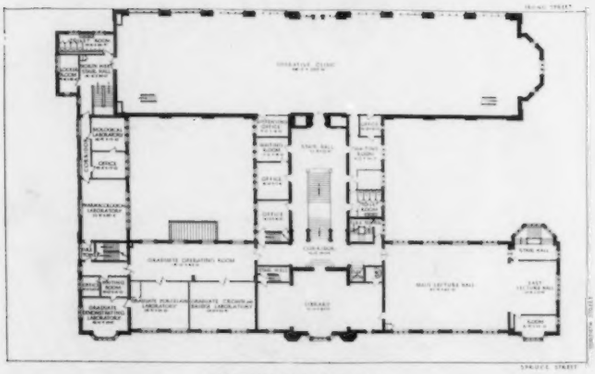
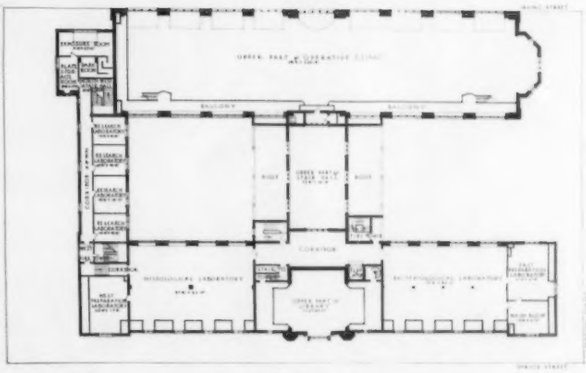
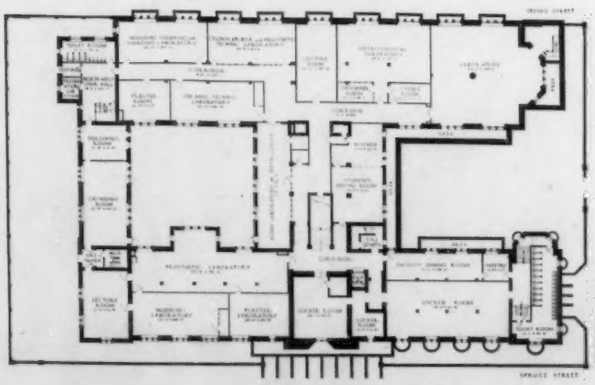


SECOND FLOOR PLAN



THIRD FLOOR PLAN



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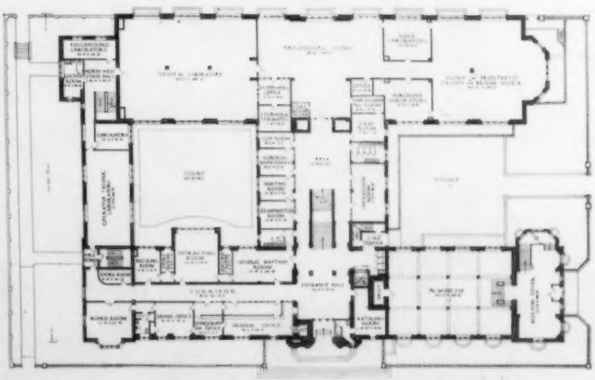

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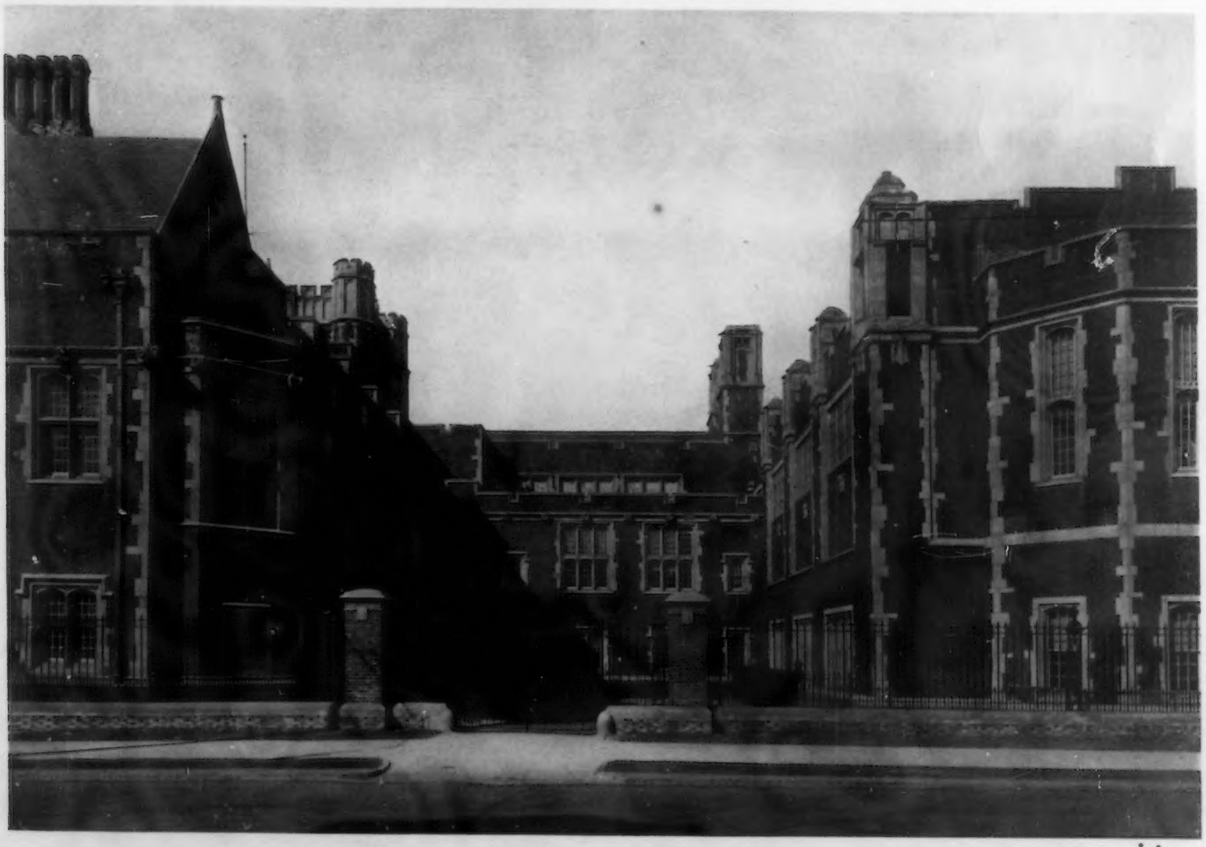

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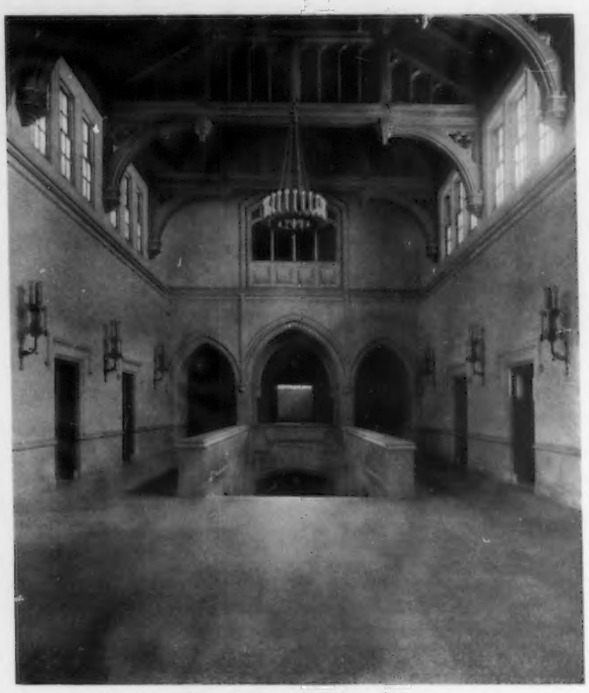

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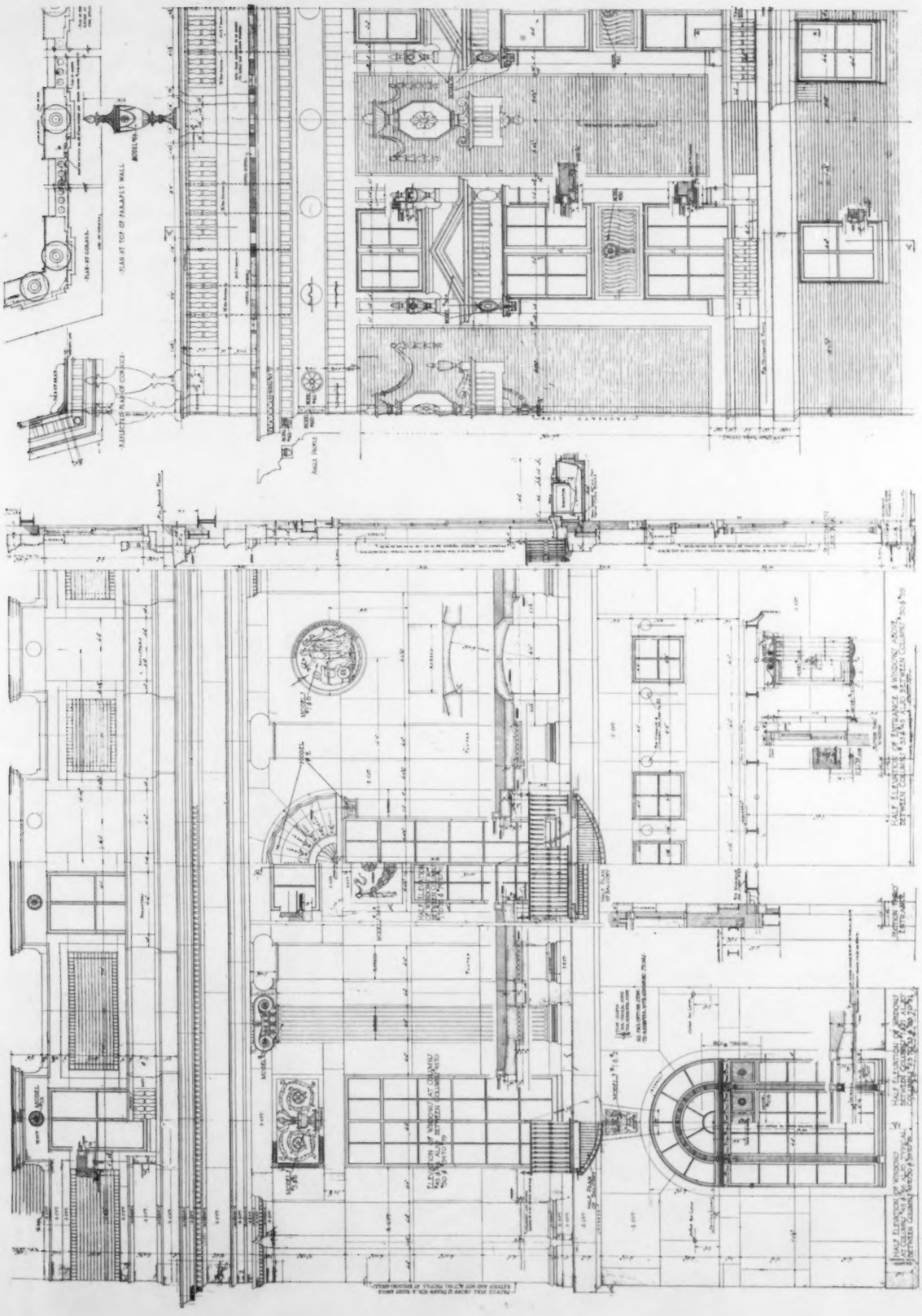

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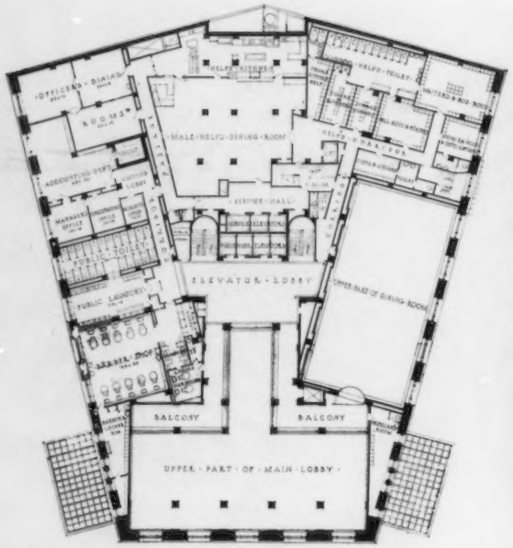
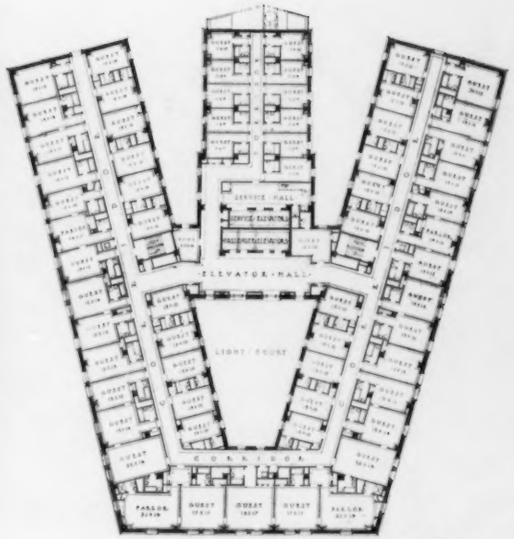
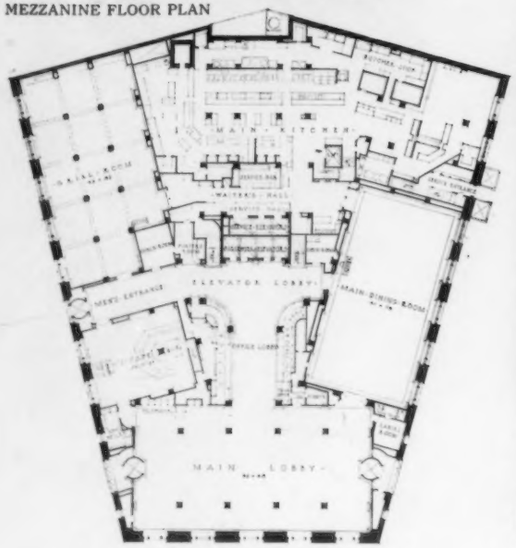



MEZZANINE FLOOR PLAN

MEN'S CAFÉ




TYPICAL FLOOR PLAN

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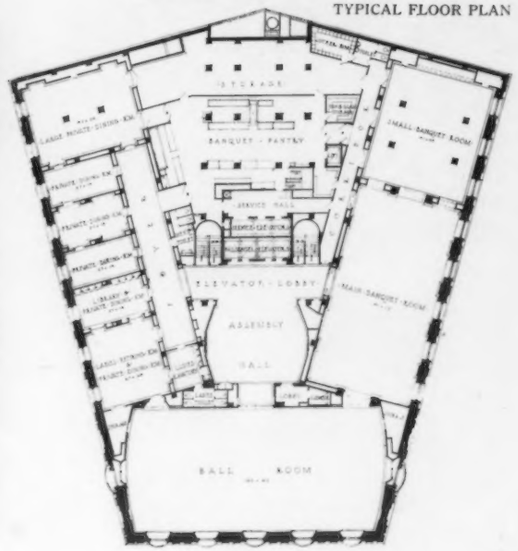
GRILL ROOM

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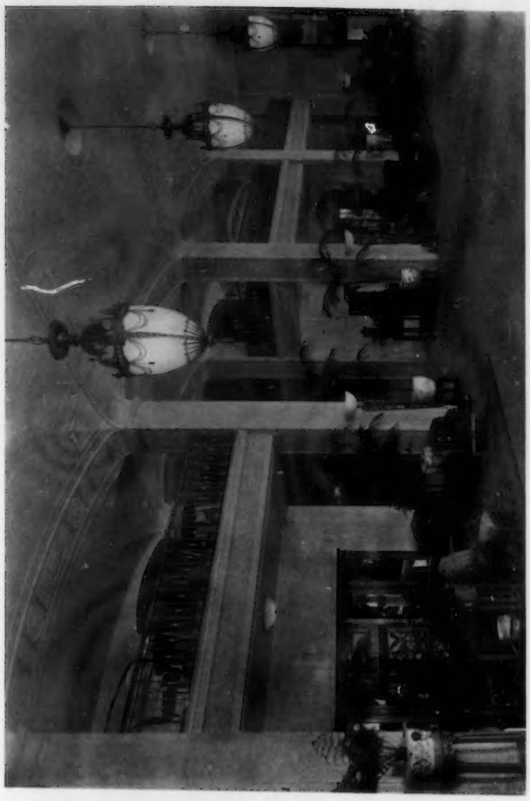
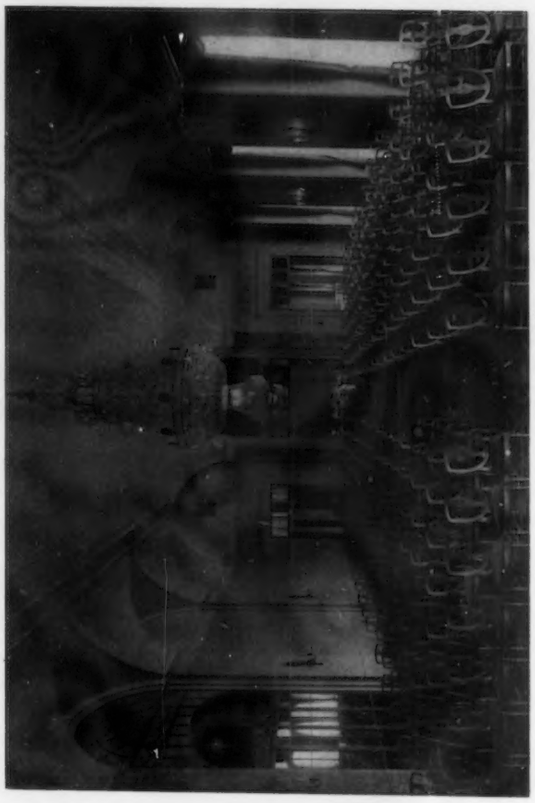
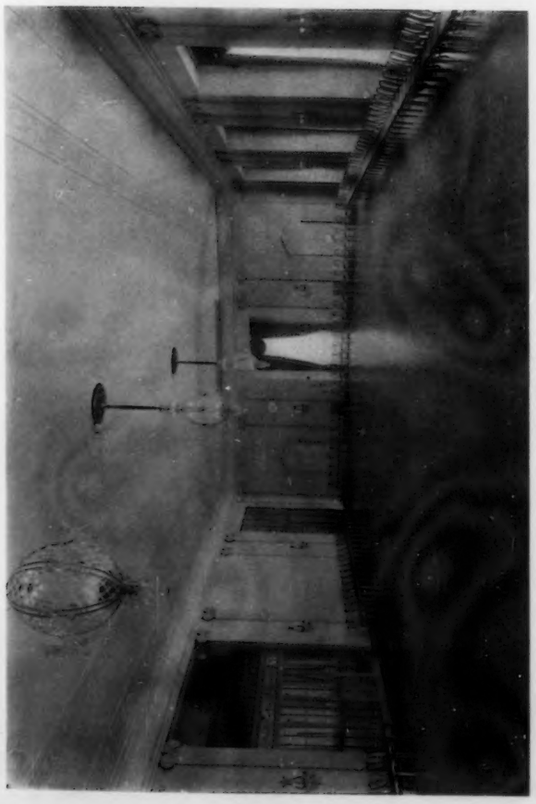


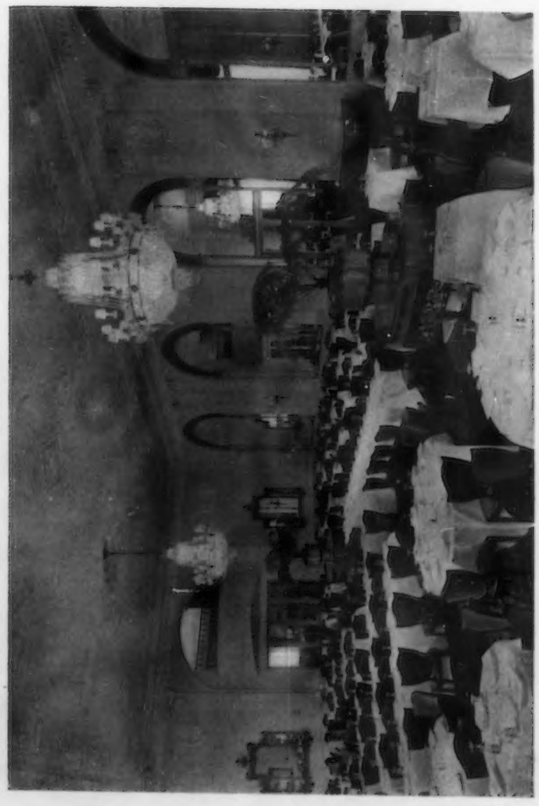
MAIN LOBBY



MAIN BANQUET ROOM



BALL ROOM



MAIN DINING ROOM

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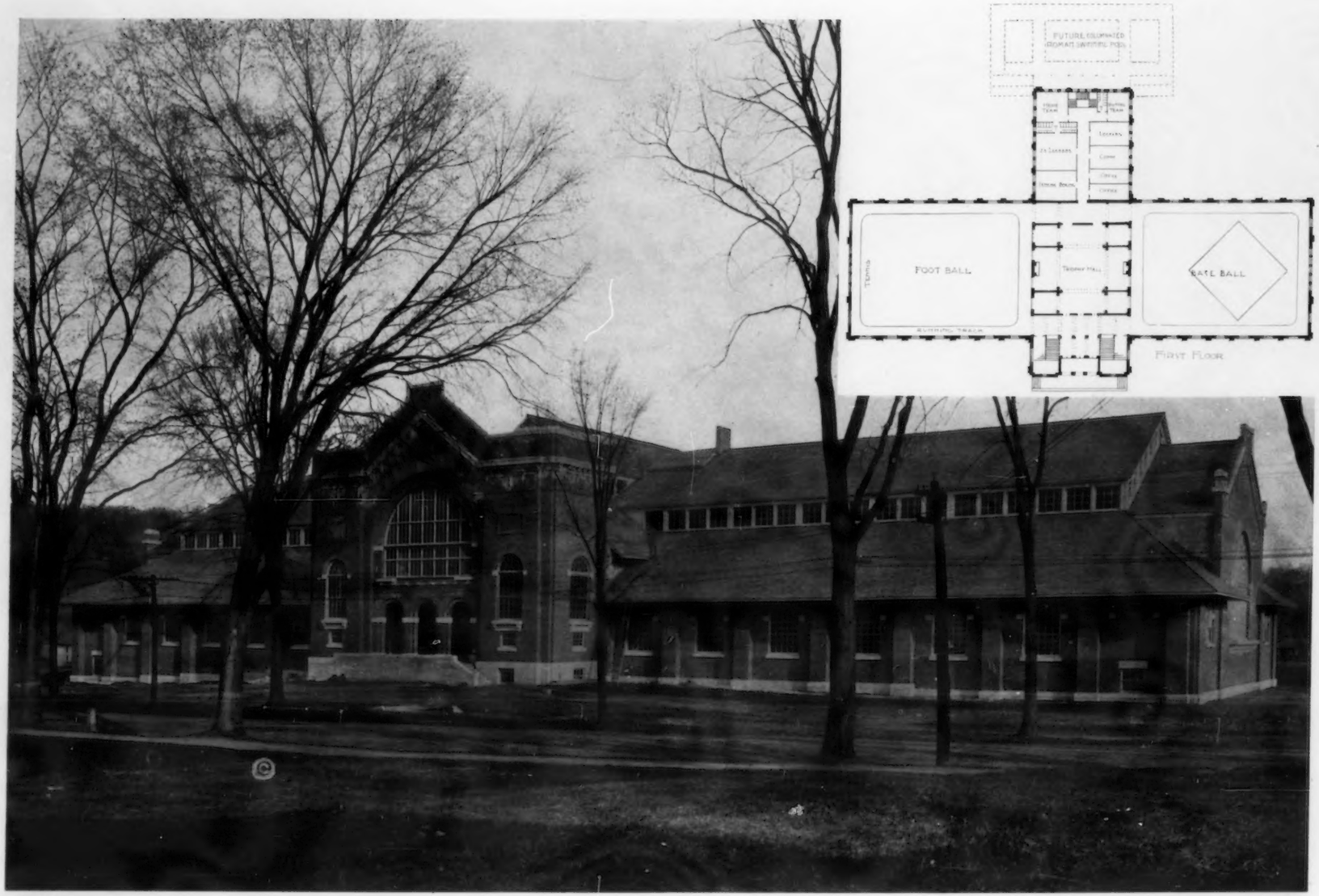


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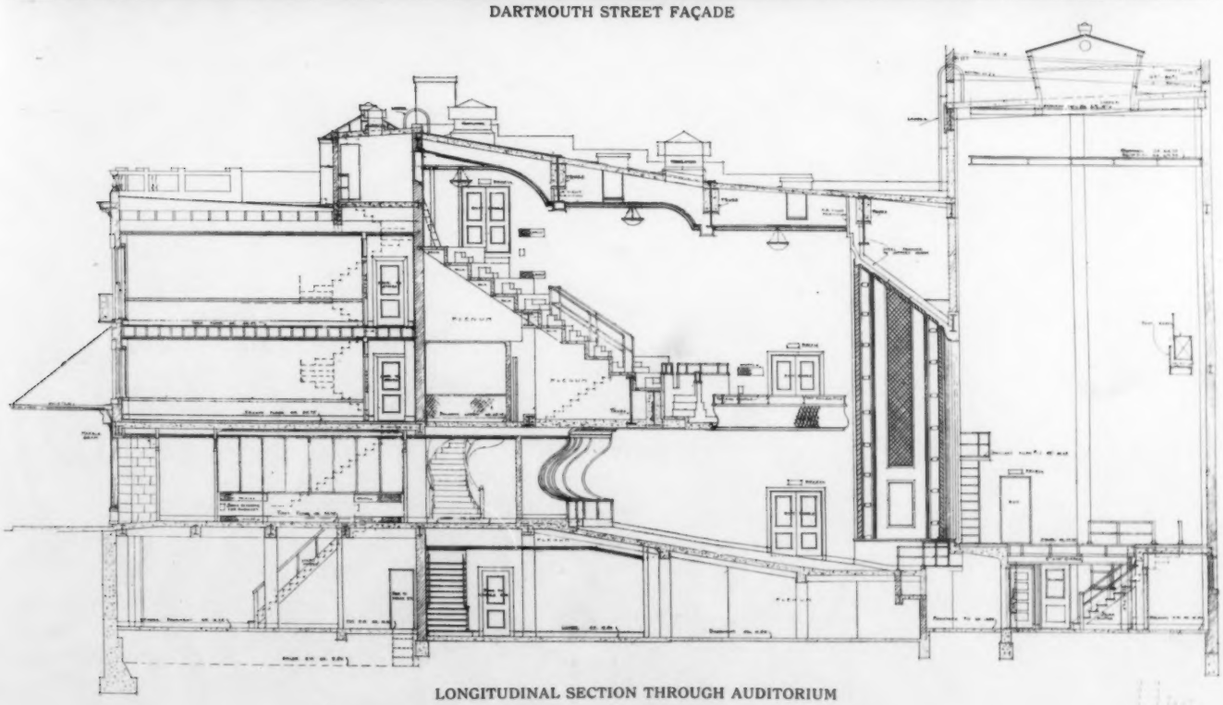

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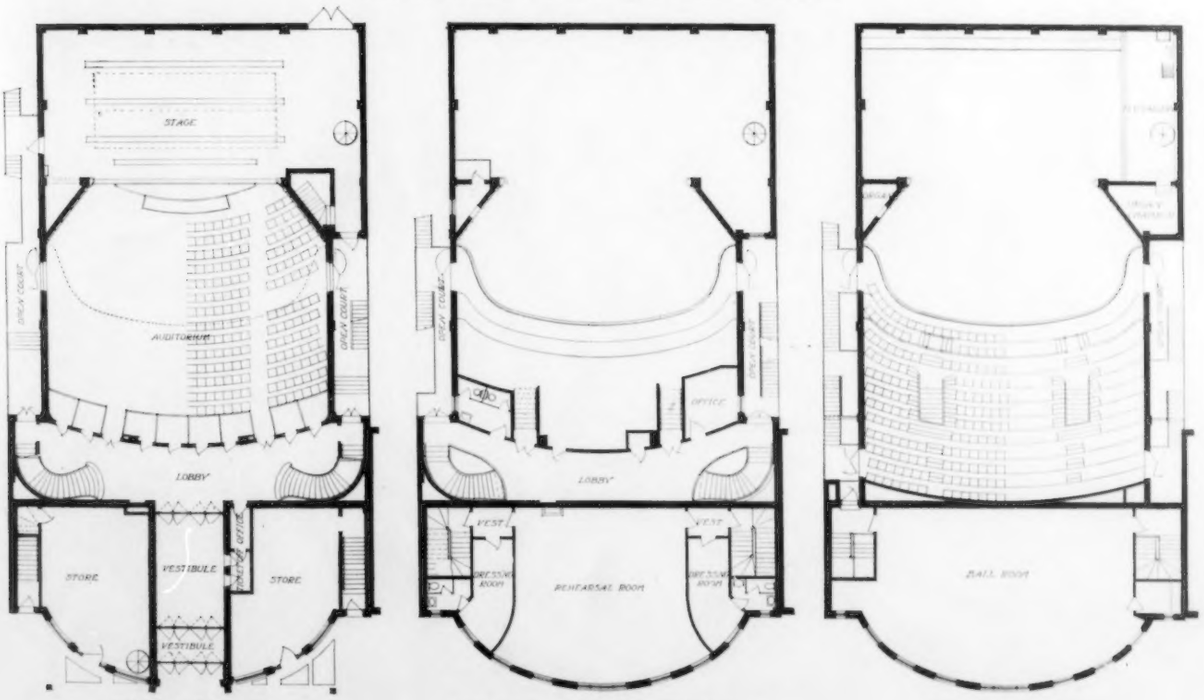
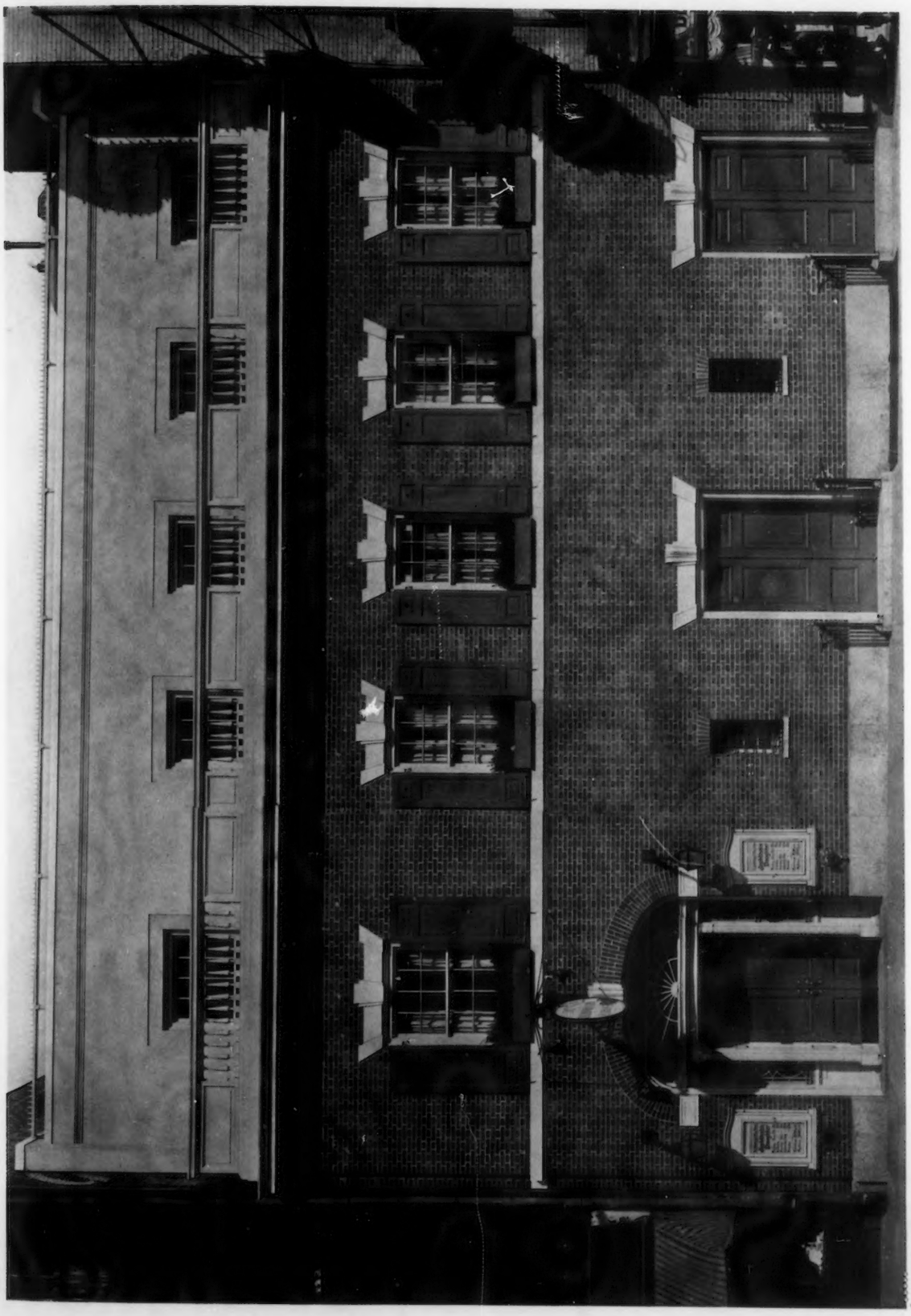


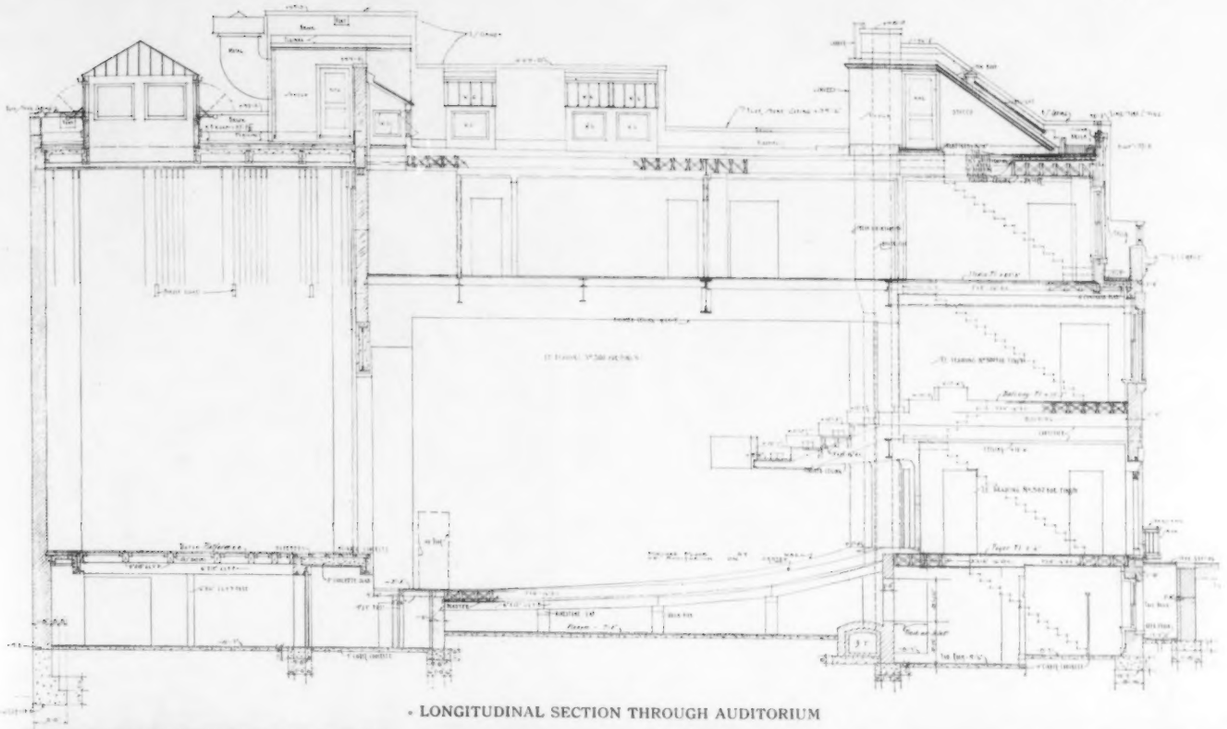

FIRST FLOOR PLAN MEZZANINE AND SECOND FLOOR PLAN THIRD FLOOR PLAN

TOY THEATRE, DARTMOUTH STREET, BOSTON, MASS.

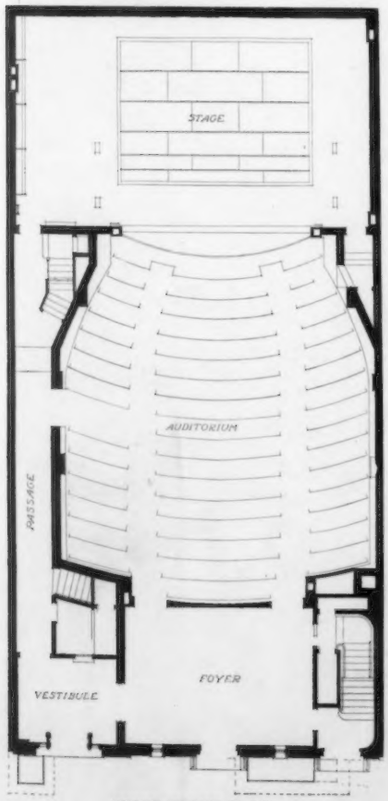
PUTNAM & COX, ARCHITECTS



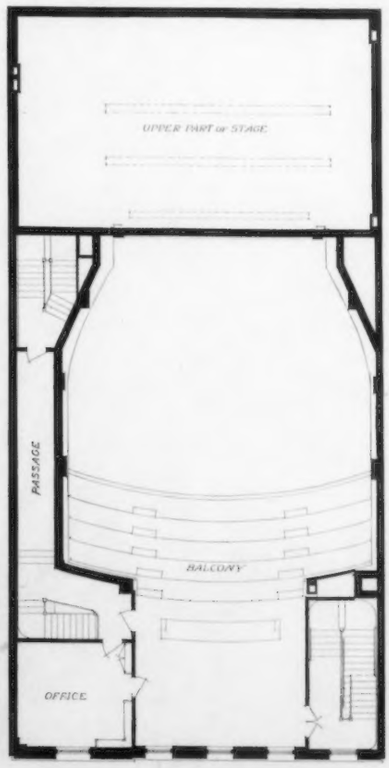
NEIGHBORHOOD PLAYHOUSE, GRAND STREET, NEW YORK, N. Y
HARRY CREIGHTON INGALLS, F BURRALL HOFFMAN, JR., ASSOCIATE ARCHITECTS



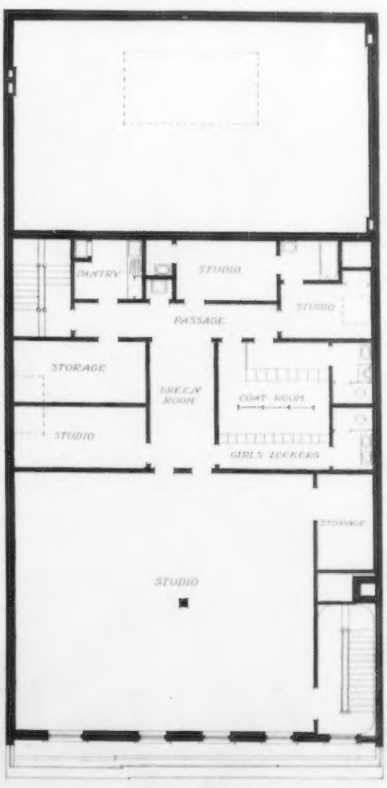
LONGITUDINAL SECTION THROUGH AUDITORIUM




FIRST FLOOR PLAN




BALCONY FLOOR PLAN




THIRD FLOOR PLAN

NEIGHBORHOOD PLAYHOUSE, GRAND STREET, NEW YORK, N. Y.

HARRY CREIGHTON INGALLS, F. BURRALL HOFFMAN, JR., ASSOCIATE ARCHITECTS

DETAIL OF AUDITORIUM

LOBBY

AUDITORIUM TOWARDS STAGE

NEIGHBORHOOD PLAYHOUSE, GRAND STREET, NEW YORK, N. Y.

HARRY CREIGHTON INGALLS, F. BURRALL HOFFMAN, JR., ASSOCIATE ARCHITECTS

# The Modern Schoolhouse.

## IV. EXPOSURE AND PLAN.

*By* WALTER H. KILHAM.

IT rarely happens that the architect is seriously consulted about the selection of a site for the schoolhouse, so that in designing the building he is obliged to adjust the plan to conditions as he finds them. In laying out the sketches a variety of questions present themselves, which in the case of a competition become poignant with anxiety. Shall the class rooms be so planned as to face south for the sun or north for the steady light? Shall the roof be flat or pitched? What will be the material of walls and trimmings? What type of window opening and sash will be adopted? Is the building to be of "fireproof" or "second-class" construction? Shall the pupils enter the building through the basement or not? and, after all, is the structure to be a monument or merely a utilitarian shelter? All these and many more questions will have to be answered before the architect finds himself in a position to appear with his sketches before the officials in charge, and a short consideration of some of them at this juncture is appropriate.

*Exposure.* Proper orientation is one of the points that first requires attention, and until it is settled not much progress can be made in laying out the plans. The question lies between the relative advantages of northern or southern, eastern or western lights for the class room, and considerable differences of opinion will be found to exist on these points. The writer has endeavored to obtain from each of several practical school men an expression of opinion on the question of exposure, together with their views as to the actual effect on the health, attendance, and mental condition or temper of teachers and pupils. Most of the answers favored as much sunlight in the rooms as possible; but some very decided opinions to the contrary were received, supported by effective and convincing arguments.

It seems to be generally admitted that the direct rays of the sun have a very important germicidal and purifying effect, and that a room which does not receive direct sunlight is for this reason not a suitable place for young children to spend a considerable portion of their time. Attempts to obtain any definite information as to relative conditions of morbidity in north and south rooms failed to elicit any exact replies; but the "cheerful, brightening, healthful, and wholesome" influence of a sunny exposure was dwelt upon by nearly all who responded. These teachers also thought that the trouble of adjusting the shades was not of great importance compared with the benefits derived from sunlight in the rooms.

The cheerful and healthful effect of sunshine is offset to some extent, however, by the injury to the eyes resulting from the glare of sunlight on the printed page. In an ordinary room a person reading or working can move about and adjust himself so as not to be annoyed by the heat and glare of the sun; but in a class room the pupil must sit at his desk in one position and is powerless to avoid its effects. The master of one of the largest schools in the country, whose buildings contain rooms facing in all four directions, writes as follows: "I would recommend, as far as possible, a steady north light, free from sun. If any other exposure is required by conditions, I should recommend an eastern exposure, thereby getting the sun in the morning. The most objectionable of all is a full south exposure. In the buildings under my control, the north exposure rooms have to my mind the least of what the teachers call 'wriggling' among the pupils. That may be due to the fact that the light does not make them nervous. I have one teacher whose eyes were nearly ruined by continued service in a south exposure room and who has had no trouble since changing to a north exposure room. In the fresh air room it is necessary to my mind to have east or south exposure." Another school man of long experience writes: "This matter seems to involve two considerations generally regarded as conflicting of necessity. A steady north light free from the sun is the ideal light for the schoolroom so far as light in its relation to vision is concerned. It is, however, a general impression among the teachers that direct sunlight is essential to the highest degree of healthfulness. Sunny rooms are more cheerful, and some believe that sunlight exercises an undefined influence on the child's general physical condition, imparting vigor and robustness; while a north light has a tendency towards pallor and anæmic conditions. Teachers, as a rule, prefer a sunny room. However, in twenty-five years of observation I have found that rooms of southern exposure invariably have bad conditions of lighting. Pupils cannot tolerate direct sunlight while they are studying, however beneficial it may be under other conditions. The result is that shades are drawn, almost invariably darkening the room too much and producing eye strain and other evils. I have never made any scientific investigation in order to secure data on the results obtained in different conditions of light. It would be a very valuable and important study well worth making."

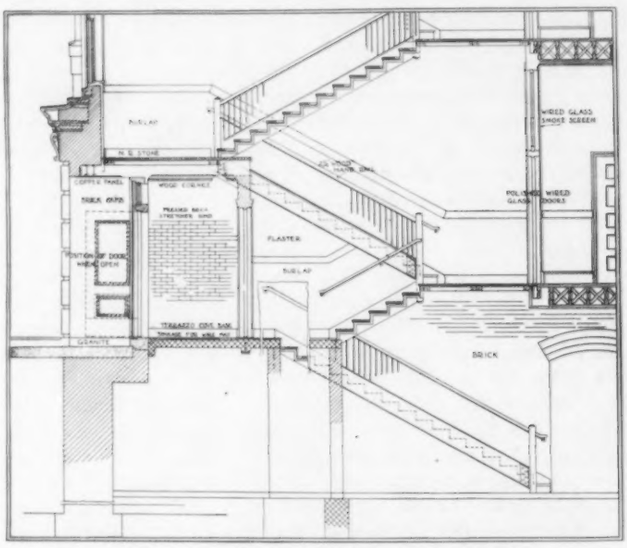
In the planning of a city building it is sometimes almost impossible to avoid having some rooms with north exposure, nevertheless it seems only fair to state that no complaints have ever reached the writer from north rooms in buildings of which he has knowledge.

The question of sunlight in its dual relations to health and to vision seems to raise a serious obstacle to a definite solution of the problem of schoolroom lighting. A plan which distorts itself in a vain effort to provide a south exposure for all of its rooms is as bad as one all of whose rooms face north; but if the rooms as far as possible can face east and west, very satisfactory conditions will have been attained. The eastern exposure is preferable, because the sun will have been in the rooms in the early morning hours, helping to start the day cheerfully and to warm the rooms on chilly winter mornings. The afternoon sun comes at a time when the rooms are overheated and the glare of its level rays is fatiguing, but many schools are not used in the afternoon. Two points still

may well be noted: drawing and sewing rooms should always be provided with north light, and laboratories and various manual training, cooking, or recitation rooms where the pupils pass only an hour or two at a time, and which are not occupied as "home" rooms, may well have the restful north exposure. On the other hand, it is a great advantage to have sunlight permeate the corridors, wardrobes, and toilets where the effect of its disinfecting powers is even more necessary.

The Boston Schoolhouse Commission requires schoolhouses to be so planned that every room shall receive sunlight during some portion of the day. While the Board believes in unilateral lighting, it concedes that it is better to have light from two sides than to have no sunlight. A room that has sunlight during all the school hours is regarded by them as not desirable.

The above discussion is still only academic if the school architect fails to take notice of surrounding conditions. In the country, neighboring trees or high hills may seriously affect the orientation of the rooms, and in the city the free light for a building may be cut off by tall buildings, either already built or liable to be. A clever set of plans was recently adopted in competition in an eastern city where the result of so extending the plan as to give all the rooms an eastern or western aspect was to bring a number of them within 30 feet of the property line on which a large apartment house was likely to be erected, which would effectually darken all of the best rooms. On paper the plan was admirable; on the lot it was a failure. It may also be desirable to locate the rooms away from a noisy, dusty roadway, or to so place them as to secure a more attractive outlook. It will rarely be found that the lot is square with the points of the compass and the architects' ingenuity will be tested to make the best of the local conditions.




Detail of School Stairways and Entrance at Grade

*Unilateral Lighting.* The amount of accommodation required being given and the question of exposure settled, the type of plan to be used will depend largely on local conditions, it being always kept in mind that a compact plan with the smallest perimeter will be the most economical. The type of plan, whether extended, H-shape, T-shape, or whatever is used, must depend largely on the orientation of the rooms, and this brings up the question of unilateral lighting in regard to which so many committee men have to be "shown." The blind ends of wings caused by this plan create an endless amount of comment and humoristic designation of unilaterally lighted school buildings as mausoleums, "cold storage plants," etc., by unthinking citizens who cannot understand the reason for not taking advantage of every opportunity for securing outside light. Unilateral lighting, however, has come rapidly into favor among practical school men, and the majority of answers to questions sent out strongly favored it. The majority of pupils are right handed and find light coming from the left the most convenient to work with. When windows are placed in the wall at the back of the pupils, another set of shadows is produced which is confusing and annoying. Moreover, the light coming from such windows is likely to prove very trying to the teacher's eyes. One headmaster writes, referring to some rooms which are lighted at the rear: "We found this very hard on the teacher's eyes. I had one teacher about eight years ago who taught in a room where she faced a south light. She was obliged to be out of school six months with a very severe eye trouble. The eye specialist said that it was caused wholly by facing the south light, emphasized by the fact that it was reflected by the roof of another building." Another master says: "Some of my rooms have light from the rear of pupils as well as the south light, and the teachers complain frequently of the discomfort of facing the light from the windows." Another objection to bilateral lighting is the blackboard space that is lost. It is evident that the worst form of lighting is that from windows in opposite sides of the same room which would cause two separate shadows from each motion of the hand. Nevertheless the writer would not hesitate to add end windows in a north lighted schoolroom in order to admit sunlight for a portion of the time.

When unilateral lighting is used, the window area must be carefully studied in connection with the wall construction. The long window wall carries the ends of the floor timbers and hence must be substantially built and able to stand a considerable load. A system of iron construction for a long group of windows is the ideal solution of this problem, as by this means the window piers may be reduced to their lowest terms, but for most suburban work this will be found too expensive. The individual single windows and frames, with brick piers between, will, owing to their simplicity, always be found the cheapest to construct and generally are adopted even if shadows are caused by the piers; but if the windows are wide and well distributed, very little inconvenience will result, provided the room is not of excessive width.

*Entrances.* Having decided upon the aspect of the class rooms, some thought has to be given to the entrances. If the school is co-educational, custom has decreed that the entrances for boys and girls shall be separated as widely as possible and the more southerly entrance be appropri-

Rear View, Gregory School, West Orange, N. J.

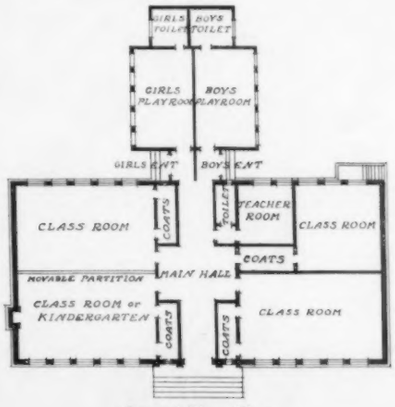
ated for the girls. Where this involves a boys' entrance at a particularly exposed northerly end, it is well to look over the plans again and see if a method cannot be devised for so locating the entrances that both shall be as sheltered from the wind and prevailing winter storms as possible.

As the doors must open outward, some sort of a housing must be arranged that will contain the doors when open and hooked back. If they are allowed to project beyond the wall line of the building, they are liable to be caught and slammed by the wind or damaged by the pupils. Where the school grounds are not fenced in, it may be necessary at night to close these exterior recesses with collapsible gates to prevent their being appropriated by loafers.

Many school architects advocate placing the doors for the pupils' entrances in the basement, so that dirt from muddy shoes, etc., is not tracked into the main corridor. By this plan the cumbersome and costly outside flights of stone steps may be eliminated and the construction of the entrance itself be considerably simplified. Upon the other hand, it means that in leaving the building pupils have a longer distance to traverse before arriving at the exit, which, in an emergency, might become a serious defect. The door itself is also more removed from the control of a teacher standing on the first floor level. Advantage may often be taken of a sloping site to secure a good basement entrance, but on a level lot it would mean elevating the building considerably to obtain it. Generally the entrance is arranged to come at the level of a landing half a flight down from the first floor, with direct communication through a door to the basement from the vestibule, outside of the vestibule door leading to the main story. These doors are of the utmost importance in keeping back smoke or a draft of air from the basement in case of fire originating there, which without them would quickly draw up the stairways and involve the entire building. If the entrance is in the basement, "smoke doors" should be installed to protect the stairway from the basement corridor. In any event, the outside door should be at the foot of the stairs, and not located at any distance which would require the pupil to traverse much of the building before finding egress.

On account of their rather exposed situation, the walls of the vestibule are best lined with smooth or glazed brick which is durable and cleanly, and the outside and vestibule doors should have their upper halves filled with glass.

The accompanying illustrations of the Fairmount School at West Orange, N. J., designed by Messrs. Dillon, McLellan & Beadel, show an interesting type of design, wherein the basement is eliminated and the pupils' entrances are through two sunny, above ground play rooms, cleverly arranged at the front of the building so as not to darken any class room. In this building the first floor is only 2½ feet from the ground. The toilets are placed on the main corridor, near the back entrances, on the main floor. This corridor is 14 feet 0 inches wide and is also utilized for hanging coats and hats. The boiler room at the rear naturally has its floor at a deeper grade, but the basement "play room" is eliminated and the sunny play room wings shown in the picture are substituted.




Ground Floor Plan

*Play Rooms.* Of what actual use is a basement play room? This question, sent out to various authorities, brought the unanimous reply, "No use." The so-called basement "play room" is usually nothing but a space remaining in the cellar after all the needs of the building

Gregory School, West Orange, N. J.
Dillon, McLellan & Beadel, Architects

General View, Fairmount School, West Orange, N. J.

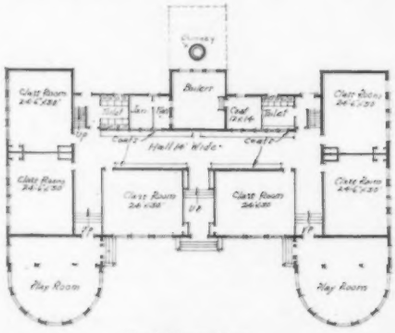
have been met, which is ordinarily equipped with a cement floor, whitewashed walls, and nothing else. It is always hot and generally either dark, damp, or dusty — frequently all three. As the architects of the Fairmount School point out, one would naturally expect the recreation rooms of a school, where the children, fatigued with indoor study, go to recuperate from the work of the class rooms, would be the pleasantest and most healthful portions of the building. If the children were at home, no one would think of sending them to the cellar for exercise and play; but that is just what is done in hundreds of school buildings. In France, schoolhouses universally have an outdoor playground, secluded from the road and enclosed by walls, along the sides of which is a roof, forming a sort of open shed known in that country as a *preau couvert*, which gives shelter when it is required and admits fresh air at all times. These walls are often decorated with the pretty green chestnut lattices so common in that country, which give a little touch of intimacy and removes the institutional appearance.

In the Fairmount School the play rooms occupy the two one-story wings on the front. These have wooden floors and are more in the nature of glass enclosed porches than rooms. In fair weather they can be completely opened up to the air, and being exactly like sheds or piazzas, they provide the ideal open air play rooms just as does the French arrangement.

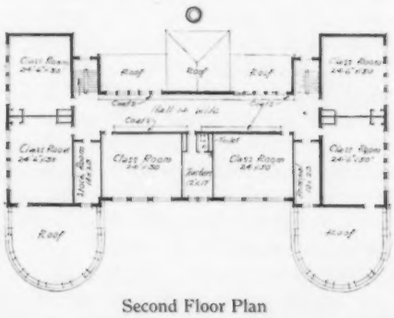
Inquiries among a number of school principals failed to find a single voice raised in defense of the basement play room, and nearly all said that if the weather was too severe for the outdoor play, they would shorten the recess and dismiss the children earlier.

Another version of the above ground, glazed-in play room is that at the Gregory School, also at West Orange, N. J., and designed by Messrs. Dillon, McLellan & Beadel. It is similarly constructed of wood, as plaster or masonry is a detriment. Only enough heating is required to take the chill out of the air in the coldest weather. It will be noticed that one of the rooms of this school (intended as a kindergarten) has a fireplace and is separated from the next by a removable partition so as to throw two rooms together for neighborhood meetings, etc.

*Yards.* In suburban districts not much trouble will be encountered in finding sufficient space around the building, but in congested cities the school yard becomes a real problem and needs careful consideration. Fencing, or




First Floor Plan




Second Floor Plan

Detail of Play Room, Fairmount School, West Orange, N. J.
Dillon, McLellan & Beadel, Architects

even curbing, is not required in most small cities, and even paved walks are optional. Large cities, however, generally enclose the grounds with a plain iron fence having gates which can be locked at night and are furnished with a standard yard padlock which is generally furnished by the School Department of the city. The play yard ought to be located on the sunny side of the building and be as large as the appropriation will allow. Boston requires a minimum of 30 square feet per pupil and paves the yards with brick sloped to drains. Colored bricks are set in the paving to indicate positions of the classes for forming in line and for certain games. Separate entrances are provided for boys and girls from their respective yards to the play rooms. Areas, steps, and inclines are avoided as much as possible. Driveways for ash and coal teams are laid with vitrified pavers on a heavy concrete base.

A grass treatment around a building is apt to prove difficult to keep in order and grass banks in particular are to be avoided. In most cases the yards are graveled or covered with stone-crusher screenings. Cinders should not be used as they are ruinous to children's clothes on account of dirt. Shrubbery around school yards ought to be encouraged, and if well cared for by those in charge is not likely to be injured by the pupils.

*The Exterior of the Building.* As brick is the exterior material of the majority of modern schools, the only material that needs discussion is that which will be used for trimmings. Hollow tile with cement finish is, it is true, used to an appreciable extent and is suitable, but brick at present is favored by most building committees. The question of materials for the cornice, sills, belts, and other trimmings is involved with the type of building proposed. If the building is to be a "monument," it will be quite likely to have a pitched roof which probably implies overhanging eaves and copper rain gutters; but if a plainer building is intended, a flat roof is likely to be called for with inside rain water disposal and no structural need of eaves. In this case the architectural style may require a classical cornice, with considerable projection or merely a Tudor string course with flat parapet walls. Whichever is employed, the young architect (and the older one as well) should see that every precaution is taken to prevent the entrance of moisture into the walls from above. The tops of all parapets should be protected by copper, turning down outside and entirely covering the back of the wall above the roof. Any masonry cornices having a flat wash over 6 inches wide should have a copper covering, no matter what their material. Any lack of care in thoroughly flashing all horizontally exposed portions is sure to result in unsightly staining and efflorescence of the brickwork and which goes on until in a few years repointing or relaying of the brickwork becomes necessary. So true is this, that any one who watches the construction of a brick building can usually predict with certainty the location of any efflorescence that will appear upon the walls.

In case the building is constructed of hollow tile, especial care needs to be taken with window sills and projecting belts. The common method of making window sills of tiles laid horizontally on a slope and finishing with an inch of cement is poor, as it is difficult to get a cement finish which will stand such exposure without crazing, cracking, and finally spalling off. A sill of granite, limestone, or marble should be used, and a copper "pan" under it is not to be despised and is well worth its cost.

Many recommend placing wire grilles over the basement windows as a protection against damage from ball playing, etc. Their cost is considerable and their utility somewhat doubtful. If used, they should be hinged to allow for cleaning the windows. To prevent their being tampered with by children, they are then provided with padlocks, which add to the security of the building from burglars, but are objected to by some who think that egress from the basement by means of the windows in

Grade Schoolhouse, Framingham, Mass.
Charles M. Baker and Stanley B. Parker, Associate Architects

case of fire should not be prevented. The writer believes that in most cases their use can be safely discontinued and an item of cost eliminated.

*Monumental Treatment of Schools.* The exterior treatment of a modern elementary school should always be dignified, but never showy or ostentatious. In the smaller cities a spirit of civic pride often impels the authorities to select a conspicuous site and give the building an unduly important character, but the practice of placing schoolhouses of any sort upon main thoroughfares is unwise. Not only is there an ever present danger to small children from swiftly passing automobiles and trolley cars, but the noise and dust is extremely objectionable, as well as the exposure of the children to miscellaneous traffic on their way to and from school. It is far better to locate the school on a quiet side street, where land is cheaper and a commodious playground can be easily provided.

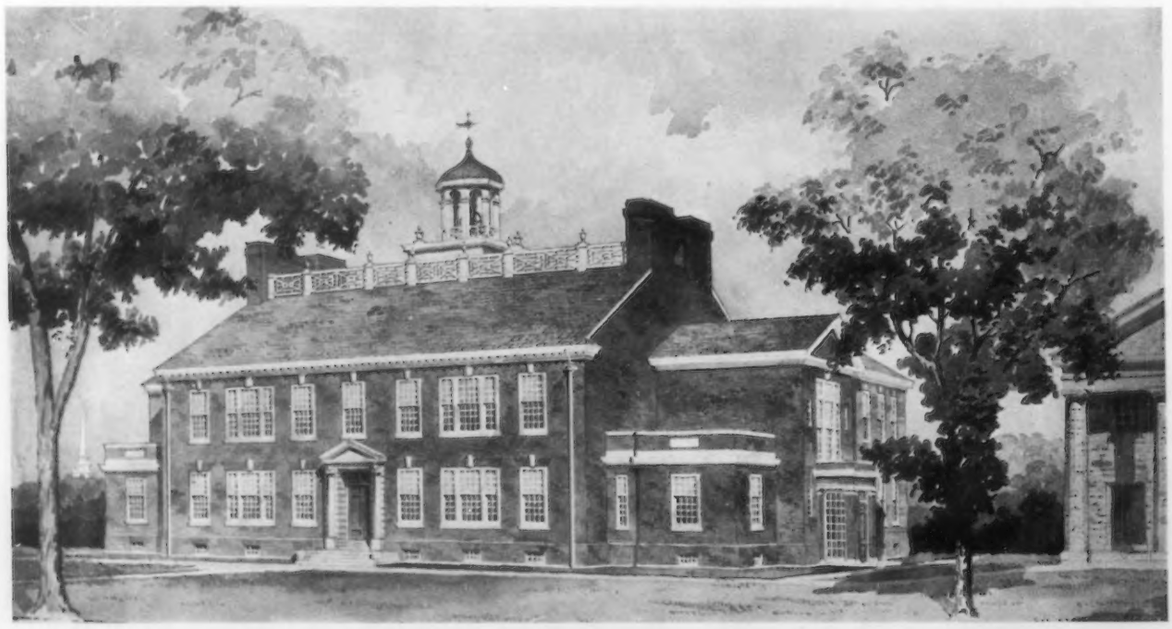
Much of the current American school architecture seems to ignore the fact that a schoolhouse is an educational institution and not a political monument. I grant that a great city school of twenty to forty rooms or more must necessarily be imposing from the mere fact of its enormous bulk; but why do buildings of such hulking proportions have to be constructed in residential districts when they are out of scale with everything in the vicinity? The city school is surrounded by large and high buildings which bring it into some sort of proper relation to the neighborhood, but no such excuse exists in the suburb.

Schoolroom story heights are necessarily greater than those of dwellings, and a high basement seems to be everywhere accepted as essential; add to this the theory that a three-story building is cheaper in proportion than one of the two stories and that land must be economized, and the building rises into the air far above the roofs of the surrounding dwellings. Just why the basement has to remain is not clear to me; if it could be eliminated as was done in the Fairmount School, the building would at once settle down into a harmonious relation to its surroundings.

The old, high pitched roofs and towers which crowned the Romanesque school buildings of the '80's and '90's have gone by; but one may well wish that a quiet Collegiate or Georgian type of brick architecture with some vestige of a visible roof might replace the current flat roofed, boxlike designs which, while appropriate to urban surroundings, absolutely fail to correlate themselves with a suburban landscape. The flat roof possesses some advantages of economy and ease of construction and eliminates the great garrets which seem so wasteful of space; but when one takes into account the easier treatment of eaves and cornices, the low sloping roof is not much more expensive.

The same line of thought may apply to the ornamental details of the exterior. The comparative cheapness of elaborate detail when executed in terra cotta or cast stone is a temptation to the young architect to show off what he knows, "*epater les bourgeois*," and bestow on the entrances and façades the results of cursory examination of plates of Beaux Arts designs, which detract from the quiet dignity which ought to characterize a building devoted to education. The fault is one which is by no means confined to schoolhouses; unfortunately there are a good many of the higher institutions of learning which rejoice in over elaborated buildings whose *parvenu* vulgarity will become a source of regret to their occupants after the lapse of a few years.

The accompanying illustrations of school buildings at Framingham, Mass., by Mr. Charles M. Baker, architect, are most agreeable examples of the scholarly adaptation of the grade school to suburban surroundings in such a way that it forms an organic and harmonious part of the village architecture, with a total absence of any exotic effect.



Grade Schoolhouse, Framingham, Mass.
Charles M. Baker, Architect

# A Garden on an English Estate.

*By* EDWARD W. GREGORY.

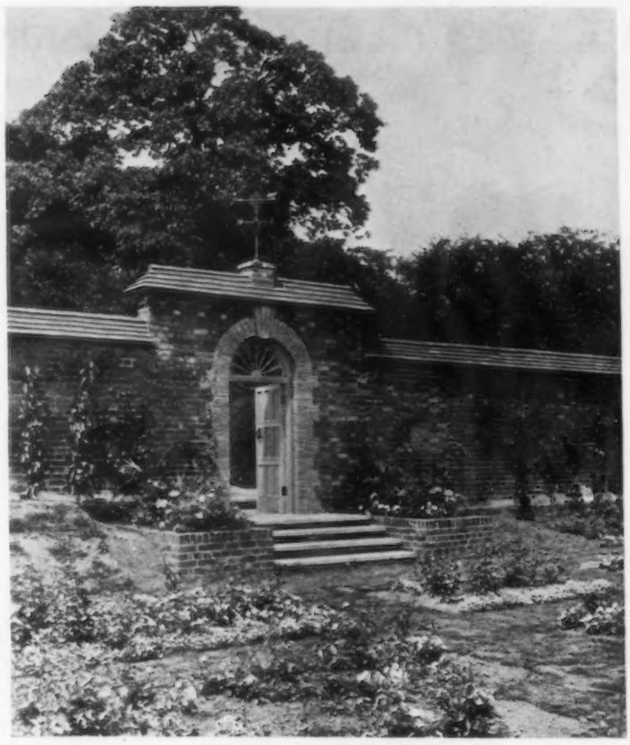
WOOLLEY HALL is an old English estate which came into the possession of the present owner, Mr. Walter Cottingham of Cleveland, Ohio, two years ago. It is situated in the Thames valley near Maidenhead, one of the most popular riverside resorts between London and Oxford. It is close to Windsor and, like other estates thereabout, is surrounded by much forest land. For the past two years continuous development of the property has been carried on under the direction of Mr. Thomas Mawson, England's celebrated garden architect, who has probably planned and carried out more public and private estates than any other living English designer. Mr. Mawson is to English architecture of to-day what "Capability" Brown was to the architecture of about a century and a quarter ago; but he has achieved a very much wider celebrity. Brown approached the layout of a plan from the gardener's point of view; Mawson from the architect's. Brown and his many followers showed their admiration of pastoral effects by copying them. Mawson is more concerned with using natural features as accents in a conventional scheme. Where Brown's idea was to have the house *in* a garden, Mawson's is to have a house *and* a garden. The former saw architecture and gardening as things apart; the latter sees them in combination. This is, indeed, the great distinction between late Georgian garden planning and that of our own day.

Garden House from the Lawn

The old garden at Woolley Hall, as found in existence by the present owner, had many desirable features and they have considerably influenced the design of the subsequent development. One of the principal and most interesting features which have been retained is a kitchen garden with an old brick enclosing wall together with a block of gardeners' cottages and glass houses. The part of the garden which is completed lies to the north of the house and has been designed on a scale which will

View of Pergolas and Garden House Across Panel Garden
Thomas Mawson, Architect

accord with the complete development which is contemplated in the future. It comprises the double pergolas, two panel gardens and garden house, tennis and croquet lawns, bowling green, and an extended walk which leads into the park. The illustrations reproduced herewith show the principal features of this portion of the estate and as the foliage and vines have not had time to make much headway, the constructional details of the design can be more clearly perceived than will be possible in the future when the planting has come to maturity.



Side Entrance in Garden Wall

Perhaps the most interesting vista is that which is to be seen from the north end of the carriage court where the three arches shown in the illustration give access to the double pergolas leading through to the domed garden house and beyond to the oval bowling green. The structure of the piers and walls is easily realized from a study of the picture. Red brick has been used for the major portion of the work, the bonding being varied by horizontal courses of thin tiles. Another illustration shows the central grass glade with pergolas on either side as seen from the garden house looking towards the south. The length of the pergolas extending from the garden house can be realized from the view taken across the panel rose garden. The texture of the enclosing walls and the general character of the architectural detail may be seen in the illustration of the small side entrance.

The owner's ideal was to attain a garden of distinctly English type, in which nature should be the predominant partner, but in which art and architecture should have recognized places. It will take another year before the pergolas and walls are sufficiently clothed with foliage for his ideal to be consummated; but a large measure of success is assured by the dignified and sympathetic character of the architectural accessories already constructed which will provide the foundation.

View of Arches in Garden Wall Looking Toward Garden House

Thomas Mawson, Architect

# As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

J. HARLESTON PARKER

HARLESTON PARKER was born in Boston in November, 1872. A graduate of Harvard in the class of 1893, he studied architecture for two years at the Massachusetts Institute of Technology. Then came a year in the office of Winslow & Wetherell, a year in Italy, and two years in Paris, where he studied at the École des Beaux Arts in the Atelier Laloux.

In the spring of 1899 he returned to Boston, and the partnership of Parker & Thomas was formed, with offices in Boston and Baltimore—an association which lasted until 1907, when the firm name was changed to Parker, Thomas & Rice.

In fifteen years of spirited and successful practice, Mr. Parker's varied enthusiasms and effective vitality have found a natural outlet. No one of our time has better appreciated the universal nature of the demands on the profession, and no one has proved himself better qualified satisfactorily to answer more of these varied calls. His commercial structures are paying investments; his clubs breathe comfort and dignity, and his private houses are worthy frames for cultivated and successful lives.

Mr. Parker's zeal for his clients' interests does not end with the signing of the contract, but from that moment seems to take on renewed vigor. Indeed, long after one of his buildings has been accepted by the owner, his vigilance and invention remain at the service of the client, with a wealth of fertile suggestion and experienced discrimination.

No account of Mr. Parker's personality can be complete which does not call attention to his peculiar talents as a draftsman. With him objective visualization has been developed to a state of rare precision. In his Harvard days, his sketches in the Lampoon were filled with amazingly lifelike representations of his contemporaries, and this happy faculty is still a source of exquisite delight to his friends. In the preparation of rapid perspective sketches for clients and subordinates, this ability is of real service, and many puzzling difficulties have been quickly solved by a quick transition to the third dimension, with its resulting clear, analytical viewpoint.

The superficial student of the Renaissance is amazed at the multiple activities of the great artists of that epoch; but a maturer examination convinces one that the artist of every time has never concerned himself with merely one side of life. — *E. S. D.*

WILLIAM B. ITTNER

WILLIAM B. ITTNER was born in St. Louis, September 4, 1864. He acquired his education in the public schools of his native city and was graduated from the Manual Training School, which is a department of Washington University, in 1884. His architectural studies were pursued at Cornell University, from which he was graduated in 1887. He engaged in the practice of his chosen profession in the following year and very successfully demonstrated his ability as a designer with a facility for expressing the refinement and charm which are characteristic of his work in many buildings of a domestic, as well as commercial character. A deep student, a painstaking investigator, and a resourceful designer, the happy opportunity came to him through his selection as Commissioner of School Buildings for the Board of Education of St. Louis in 1897 to bring into full play all these latent attributes. The result has not only placed its deep impress on the city of St. Louis, the happy possessor of these model buildings, but his influence and the high standard which he has set in the planning and designing of educational buildings has made him an eminent authority abroad, as well as throughout the length and breadth of his own country. As an architect he has made his field of activity particularly and peculiarly his own. As a man, he has commanded and received the respect and sincere liking of his fellow-citizens and co-workers in the profession.

Mr. Ittner is a Fellow of the American Institute of Architects and has been president of the St. Louis Chapter. His standing among his fellows is further indicated by the fact that he has been president of the St. Louis Architectural Club and of the Architectural League of America, and his popularity among the alumni of his Alma Mater, as attested by his elevation to the presidency of the Cornell Club. The dearest distinction and highest honor in Mr. Ittner's eyes must ever be his possession of the first medal awarded to him by the St. Louis Chapter of the American Institute of Architects for his conspicuously meritorious work in his chosen field. No tribute could better evidence his acknowledged supremacy in that field, coupled with an appreciation of all that makes the life of man worth living, than this spontaneous expression of appreciation of these qualities by men with whom he has worked for so many years shoulder to shoulder.

— *J. L. M.*

WILLIAM WELLES BOSWORTH

WILLIAM WELLES BOSWORTH was born in Marietta, Ohio, on May 8, 1869, and received his early education at the Marietta Academy. At the age of sixteen he entered the Massachusetts Institute of Technology and was affiliated with the Class of 1889. Upon completing his course at Technology, he took up work with Shepley, Rutan & Coolidge, and spent a season with Frederick Law Olmstead in landscape design, assisting in the development of the group plans for the Leland Stanford Jr. University. Following an extensive tour of Europe with William Rotch Ware, he established a practice of his own, designing several charming country cottages at Mt. Desert and Long Island, and completed a group of buildings for the Hampton Normal and Agricultural Institute.

Due to the persuasion of Thomas Hastings and John Galen Howard, he decided to resume his architectural studies at the École des Beaux Arts, but went first to London, where he enjoyed the opportunity and inspiration of studying under Alma Tadema. Then Paris claimed him and he entered the atelier of Godefroy & Freynet, and later the École des Beaux Arts and the atelier of Gaston Redon. He also spent considerable time working under Chaussemiche. After further travel in Europe, he returned to New York to enter the office of Carrère & Hastings, and was given charge of the plans for the Pan American Exposition at Buffalo, later going to the Exposition as resident architect. A little later he was retained by the Group Plan Commission of the city of Cleveland to develop working plans for the improvement of that city. In the competition for the West Point Military Academy Buildings he was associated with Messrs. Cram, Goodhue & Ferguson, who were the successful competitors.

He has built up a large practice in New York, and among the most notable examples of his work are the beautiful gardens for Mr. John D. Rockefeller at Pocantico Hills, the town house for Mr. Rockefeller, Jr., and the great white granite building which is now nearing completion for the Western Union Telegraph Company.

In February, 1913, he was appointed architect for the new buildings of his Alma Mater, the Massachusetts Institute of Technology, which are now well under way, and give proof that he has nobly solved the diverse requirements of a group of educational buildings of this magnitude, and that he has preserved an architectural dignity and simplicity compatible with the highest ideals of his profession.

Mr. Bosworth has ever cherished the best traditions of Greek art, and instils in everything that he does a classic sense of simplicity and refinement of detail. To this appreciation for the classical, he brings a highly developed quality of sensitive selection. It is this perfection of taste that distinguishes all that he creates, and the recognition of which is a vital principle of all enduring art. — *H. E. K.*

BERTRAM GROSVENOR GOODHUE

TEN or more years ago Mr. Goodhue was thought of chiefly as an accomplished artist in pen and ink, and his admirable drawings are too well known to need more than a mention. Now his pen and ink have been almost entirely laid aside, and he is accepted by all as one of our leading architects.

This change in Mr. Goodhue's medium from pen and ink and shiny Bristol board to bricks and mortar and graduated slate has, of course, been due to the steadily increasing demands on his time in conducting his practice.

To any one very familiar with Mr. Goodhue's work and his methods of working, several points cannot fail to attract notice. One of these is his unerring eye for picturesque composition. In his drawings and also in his executed buildings one usually finds an interesting grouping of parts. Nowhere is this better exemplified than in the buildings of the San Diego Exposition and in the preliminary drawings for the same.

In addition to this capacity for arranging the various parts of his problem into a picturesque and well-balanced whole, his work also shows the joy he takes in perfecting and making interesting the very smallest details. In fact, it is not unlikely that he delights more in the finish of his hand-wrought, half-polished, iron hardware than in some of the bigger things of the profession.

It is this personal attention that he so willingly gives to the small things that makes his buildings so full of interest.

Mr. Goodhue's personality is evident everywhere in his work to those who know him and his work intimately. Everything that comes from his busy office is unmistakably his and is characterized by a certain cleverness and freshness of expression. To Mr. Goodhue an architectural "bromidism" is almost an unpardonable sin. It is his continual searching for new and interesting forms, coupled with a thorough knowledge of the work of the Middle Ages, that has caused him to be regarded as an authority on contemporary Gothic art.

Mr. Goodhue's early and indeed only professional training was received in the office of James Renwick in New York. Mr. Renwick was the designer of Grace Church and St. Patrick's Cathedral; therefore, Mr. Goodhue's architectural instruction from the beginning had a strong Gothic tendency.

Before entering the office of Cram & Wentworth in Boston he had proved his ability as a designer by winning the competition for a cathedral at Dallas, Tex., and, after a year spent with Cram & Wentworth as chief draftsman, he was given a full partnership in their practice.

In 1903, after the firm had won the West Point Competition, Mr. Goodhue assumed the responsibilities of the New York office of Cram, Goodhue & Ferguson.

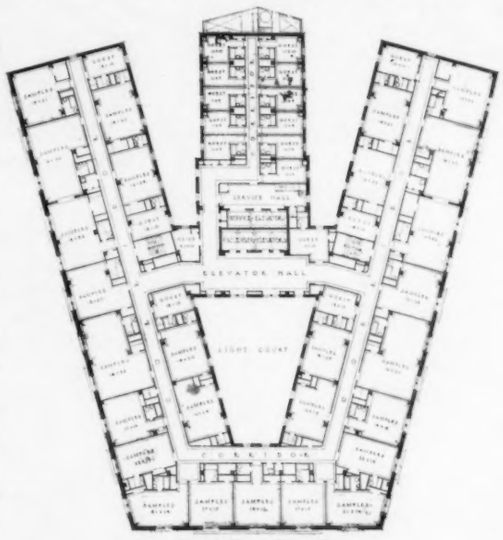
In January of last year the partnership was dissolved, and Mr. Goodhue is now conducting an independent practice in New York. — *E. D. R.*

# PLATE DESCRIPTION.

THE EVANS MUSEUM AND DENTAL INSTITUTE, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA. PLATES 46–49. This building was built from funds left by the late Dr. Thomas W. Evans, an eminent scientist and dentist. Its architectural style may be described as Collegiate Gothic. The Evans Museum occupies the east half of the Spruce street wing, and is as nearly fire and burglar proof as modern science can make it.

A feature of the building is the large operative clinic in the north wing on the second floor. This occupies the entire wing on Irving street and is 200 feet long and 48 feet wide. It is 30 feet high and is flooded with daylight from the north side, and a skylight 10 feet wide running the length of the ceiling. The room is furnished with 136 chairs, equipped with electric service for power and light, also gas, compressed air, and water service. A power house furnishing power for the lighting and heating, as well as for the service of the laboratories and the clinic, adjoins the building on the north.

HOTEL STATLER, DETROIT, MICH. PLATES 50–53. The Hotel Statler follows in its design the style known as Adam, or the type of architecture derived from the classical and Italian Renaissance. The two lower stories are of buff Indiana limestone laid in wide horizontal courses with a granite base. The shaft of the building is constructed of brick, laid up with a gray mortar joint in English cross bond, which gives a slight diaper pattern to the walls. The three upper stories are of brick and terra cotta.



Sample Room Floor Plan
Hotel Statler, Detroit, Mich.
Geo. B. Post & Sons, Architects

The building is sixteen stories high. The first two floors, each of which has a mezzanine floor, are devoted to public rooms with the necessary service quarters. Above are eleven guest room floors with a total of eight hundred rooms and two floors devoted to sample rooms. A servants' dormitory floor is located immediately under the roof. Below grade, the laundries, mechanical plant, store rooms, etc., are arranged in a basement and subbasement. There are no public rooms below the ground floor, the barber shop, toilet rooms, etc., being located on the first mezzanine.

The private bathrooms which are provided with each bedroom are ventilated by a system of forced ventilation, and between every two bathrooms is a shaft containing all of the supply, waste, and other pipes, which are accessible from within each bath through an opening large enough to admit a workman.

GYMNASIUM, DARTMOUTH COLLEGE, HANOVER, N. H. PLATES 54, 55. Dartmouth College Gymnasium is unique in that it gives facilities for thorough practice for both baseball and football in very large inside courts. Through the center of the building, one story above the ground floor, is a large Trophy Hall, 80 feet square. There is a gymnasium floor space 360 feet long through the center of the building for 100-yard straightway runs. The Drill Hall, 85 by 280 feet, with an open truss roof ceiling, is located above the Trophy Hall, at the end of which are staircases and across the front an observation balcony.

TOY THEATRE, BOSTON, MASS. PLATES 56, 57. The Toy Theatre is the outcome of a desire to create a small and distinctive playhouse in which plays of the highest order could be presented. Restrictions on the property required the front of the building to set back 14 feet from the street line, but as bays were allowed to extend over this line, and their size was not specified, the front of the building took the form of one large bay, which finally became the most distinguishing exterior feature of the building. The first of the three stories is of marble with delicate Corinthian columns of cast iron. The second and third stories are of water-struck brick with white marble trimmings and wrought iron balconies at the third story windows.

In the auditorium only enough ornament is used around the proscenium opening to draw the eye to it and make it act as a frame for the scenes which are being enacted on the stage. The walls and ceiling are plain surfaces of gray white relieved by a small amount of plaster decoration and spots of warm color and black in strong contrast discreetly used. A row of boxes forms the rear of the auditorium. Together with these, the main floor comfortably seats 400. The balcony capacity is 300, making a total seating capacity of 700.

NEIGHBORHOOD PLAYHOUSE, GRAND STREET, NEW YORK. PLATES 58–60. The building is arranged to be used by a semi-public philanthropic organization for its own activities, primarily as a theater, secondarily for social purposes of various kinds. The façade is of light red brick with white marble trimmings, the third story, which sets back from the street, being of stucco. The auditorium is 40 feet wide and 46 feet deep and accommodates about three hundred people on the floor in seventeen rows. It is about 22 feet high and has a flat ceiling, treated very simply with plain moldings. There is a small balcony of seven rows which accommodates about one hundred people. The orchestra pit will accommodate, at least, eighteen musicians. The large panels on the wall above the wainscot have been treated with acoustic felt. While the vestibule, lobby, and other principal rooms are painted in an old ivory tone, the auditorium has a body color like old parchment, and on this certain parts of the decorative features are brought out in black and a grayish yellow, making a very striking contrast and giving the room a distinctive character.

# EDITORIAL COMMENT AND NOTES FOR THE MONTH

IN his address at the annual banquet of the American Institute of Architects on Dec. 4, 1914, Mr. C. Grant La Farge spoke of the highest duties of the architect, those of "forwarding our civilization." His appeal is to men already competent in all the technical requirements of his profession, and in all the skill of professional relations, and he distinctly and justifiably states that these accomplishments are but the weapons to be used for still greater achievement, and that they carry with them, the more they are possessed, higher and greater responsibilities and duties for the "forwarding of our civilization" — the civilization of mankind, not alone of individuals, of communities, of nations, but of humanity. *Noblesse oblige*. Capacity, skill, must impel to ideals or they forfeit the birthright. All that may be obtained by study, all that may accrue by natural or acquired advantages, should be at the service of a still greater endeavor, that of the "forwarding of civilization." And to the architect is given almost a unique opportunity. In his hands rests the materialization of dreams. His creations are the least evanescent of the material works of man; his work alone is that of man's creation, demanding nothing of nature but her materials and her accord. If, therefore, he places in the material pageant of man's environment forms which he alone creates, his responsibility is great indeed, and demands forethought, preparation, and persistent idealism.

There are many spheres of action for which the architect is especially well adapted. He is closer in relation to the business world than is any other artist, and his advice can be of not only æsthetic but of material value. The vast means of legislatures and of corporations have constantly been ignorantly expended in matters of which the architect has expert knowledge. The prevalent idea that he is a spendthrift is one of a lack of perception that he has knowledge which conserves the greatest values of his work, which should be that of the highest utilitarian efficiency plus distinguished expression. He should apply his knowledge to the conception and promotion of great enterprises.

It is the architect who should foresee the demands of the public in the future, not merely satisfy them in the present and thereby lay an intolerable burden upon future development. He should accept the dicta of opportunism only after all means to secure his ideal had been exhausted, and then merely as a progressive step in the right direction. The field of his endeavors is not confined to actual work, it is devoted to the conception of achievement beyond his own span of life. He should be a dreamer whose dreams may be often realized by his successors.

An appreciation by the public of the benefits of attractive environment is created by the object lessons which architecture provides. Standards of taste can be inculcated, but must be accompanied by excellent examples. In imagining and creating these examples lies the justification of the architect in its best sense. He must make his dreams come true. Whether it be in coördinating fancies with facts, in establishing canons of action, in stimulating endeavor, the motive should be sincere, high minded, and direct. It is not merely his expert knowledge of planning and development, his appreciation of proportion, of color and detail, — an appreciation that evades the untrained, but wisdom of perception and clarity of advice and sincerity of action that is demanded of him. Nothing less is worthy of his profession. It is this attitude of mind which is more and more becoming evident, which is making the Institute of Architects a power in the community, which is slowly but surely impressing itself upon the public. It is only in recent years that the architects have been requested for their opinion upon large federal and municipal expenditures, since the initiative in many subjects of national interest has been taken by them. It is only a few years since the intention of their professional ethics, no matter what the tentative details may have been, has been recognized as being upon a plane which at one time would have been thought Quixotic, but now is felt to be progressive. The profession of medicine has for centuries, from the time of its patron saint Cosimo, been considered to be one of altruism, in which the element of public service was one of its highest attributes. Now appears the same code in the profession of architecture, elevating the accomplished artist, the capable administrator, the imaginative dreamer into a citizen who is deserving well of his fellowmen, who frankly takes the stand that his ability and achievements are but means to an end — that mentioned by Mr. La Farge, the "forwarding of our civilization."

The architect, therefore, has an evangel to preach, and he is qualified to speak. When he states that the destruction of works of art of the past is far more than a temporary evil; when he claims that the apologies for such destruction are of little value; when he asks that at least protest should be put on record, he is "forwarding our civilization." When he states that ignorance of art is stultifying, that appreciation of art is elevating, and that apathy towards it produces an atrophy of some of the finest qualities of man's mind, he is "forwarding our civilization." When he states that the approval of matters of art, if allowed to remain in the hands of the ignorant, is imbecile; that control and expenditure of public moneys for art in the hands of the venal is criminal, and should be so considered, he is "forwarding our civilization." When he offers, as he does, the best that is in him, in suggestion, advice, and achievement, and finds it ignored and offers it again and again, knowing that in the end, beyond his time, the record of his action will help that best to prevail, he is "forwarding our civilization." These are the duties of the architect beyond his skill in his profession.

# THE BRICKBVILDER COLLECTION

## EARLY AMERICAN ARCHITECTURAL DETAILS

PORCH ON THE HOSMER-WATERS HOUSE, SALEM, MASS.
SAMUEL McINTIRE, ARCHITECT BUILT IN 1795

MEASURED AND DRAWN BY

GORDON ROBB & M. A. DYER

Plate Five

(over)

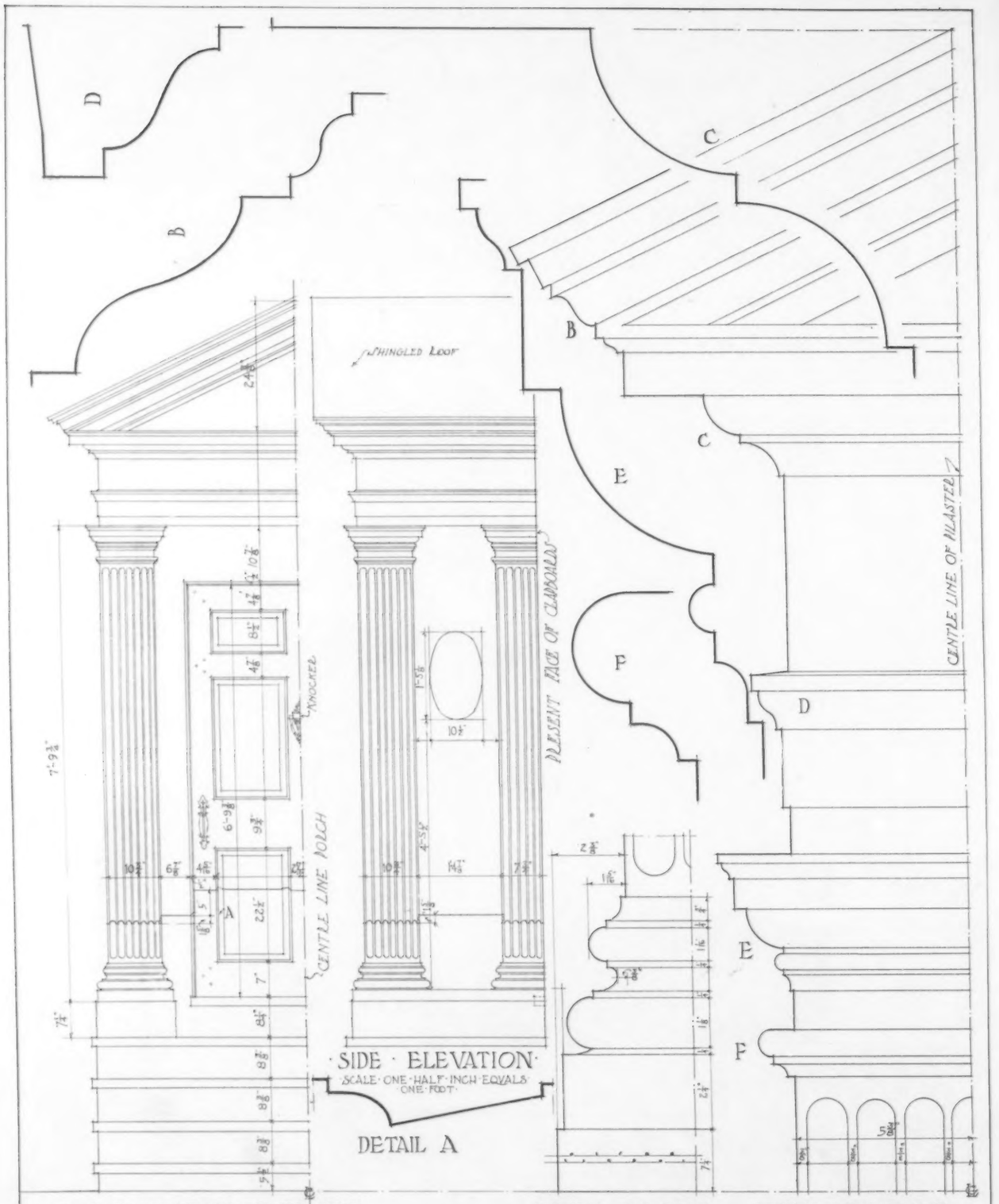



PLATE 5.
MAY 1915.

# PORCH ON HOSMER-WATERS HOUSE

SAMUEL McINTIRE ARCHITECT.

BUILT IN 1795 SALEM MASS.

MEASURED & DRAWN BY GORDON ROBB & M.A.DYER.

CASA DE LOS MALDONADOS, SALAMANCA, SPAIN
EARLY XVITH CENTURY